14 JULY 1960

ONE SHILLING
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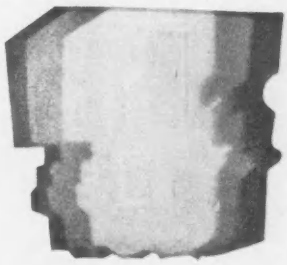
ELECTRICAL TIMES



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A HENLEY Series 3 60-amp double-pole insulated service Fuse, with fuse, neutral and combined sealing chamber.

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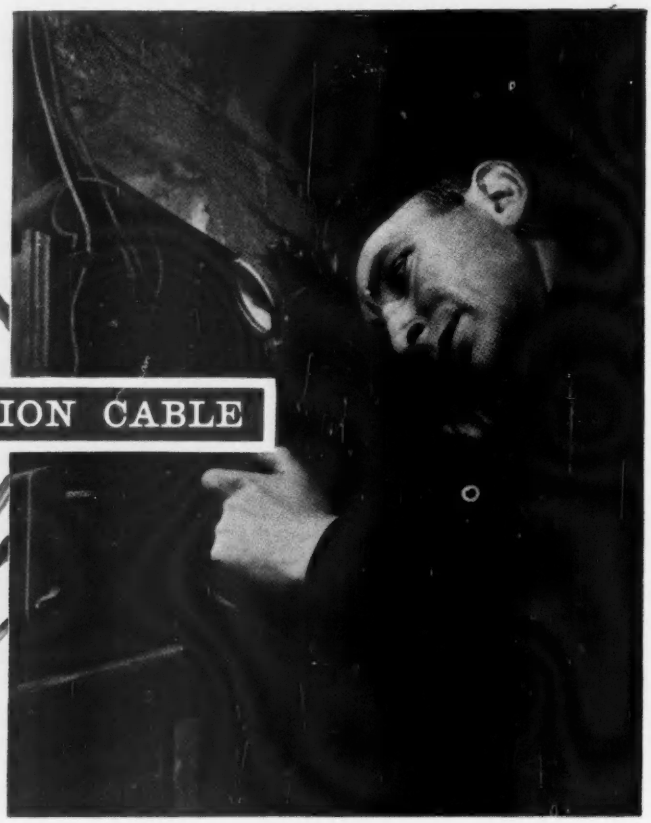

In the mining industry safety of personnel, as well as efficient operation, depend to an exceptional degree upon completely reliable signalling and telephonic communication. To meet the exacting requirements of mining and other industries Hackbridge Cables make a complete range of robust, yet flexible, Plastic Sheathed Communication Cables which will not support combustion.

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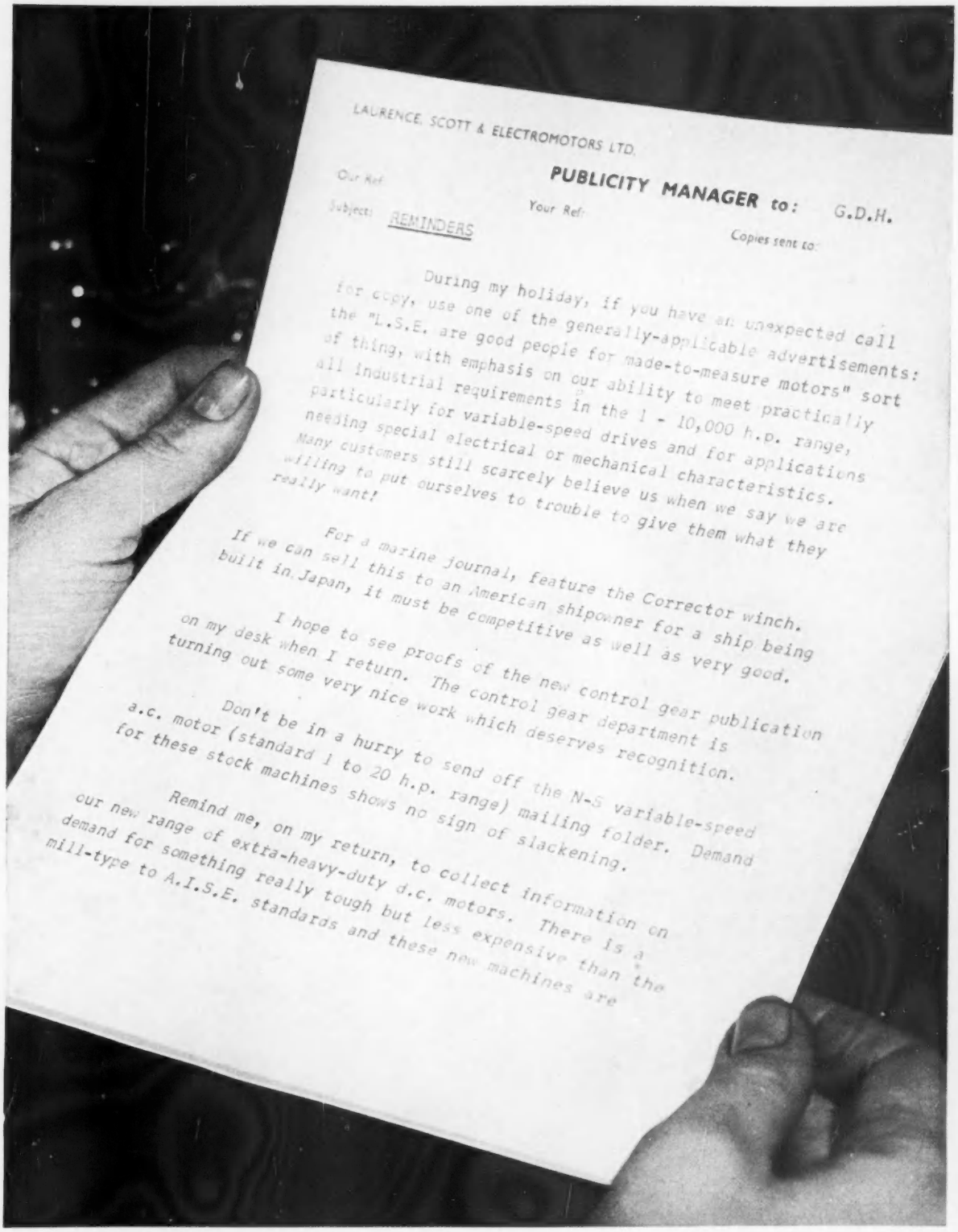
LAURENCE, SCOTT & ELECTROMOTORS LTD.
Our Ref:
PUBLICITY MANAGER to: G.D.H.
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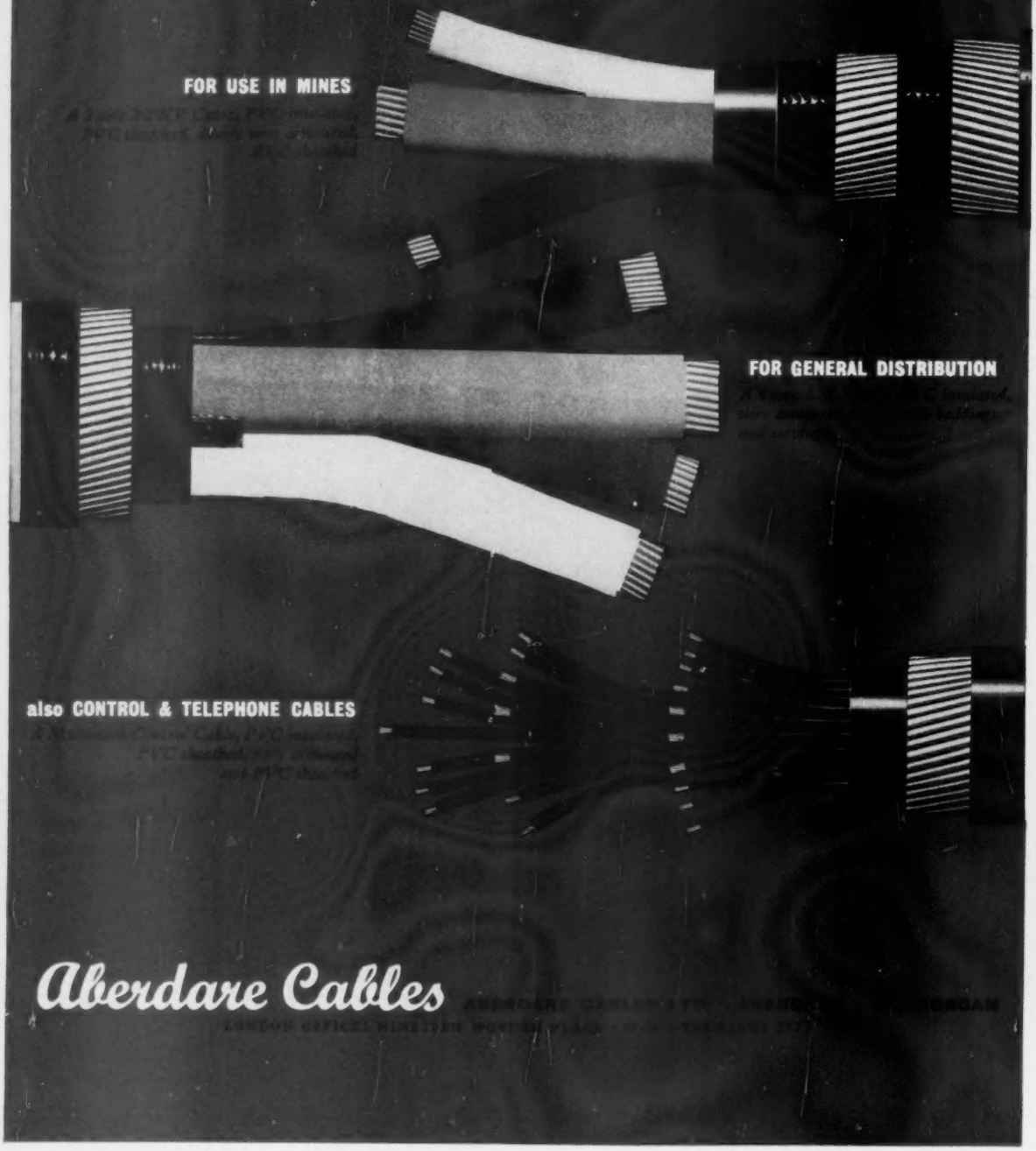
Subject: REMINDERS
Copies sent to:
During my holiday, if you have an unexpected call for copy, use one of the generally-applicable advertisements: the "L.S.E. are good people for made-to-measure motors" sort of thing, with emphasis on our ability to meet practically all industrial requirements in the 1 - 10,000 h.p. range, particularly for variable-speed drives and for applications needing special electrical or mechanical characteristics. Many customers still scarcely believe us when we say we are willing to put ourselves to trouble to give them what they really want!
For a marine journal, feature the Corrector winch. If we can sell this to an American shipowner for a ship being built in Japan, it must be competitive as well as very good.
I hope to see proofs of the new control gear publication on my desk when I return. The control gear department is turning out some very nice work which deserves recognition.
Don't be in a hurry to send off the N-S variable-speed a.c. motor (standard 1 to 20 h.p. range) mailing folder. Demand for these stock machines shows no sign of slackening.
Remind me, on my return, to collect information on our new range of extra-heavy-duty d.c. motors. There is a demand for something really tough but less expensive than the mill-type to A.I.S.E. standards and these new machines are

LAURENCE, SCOTT & ELECTROMOTORS LTD

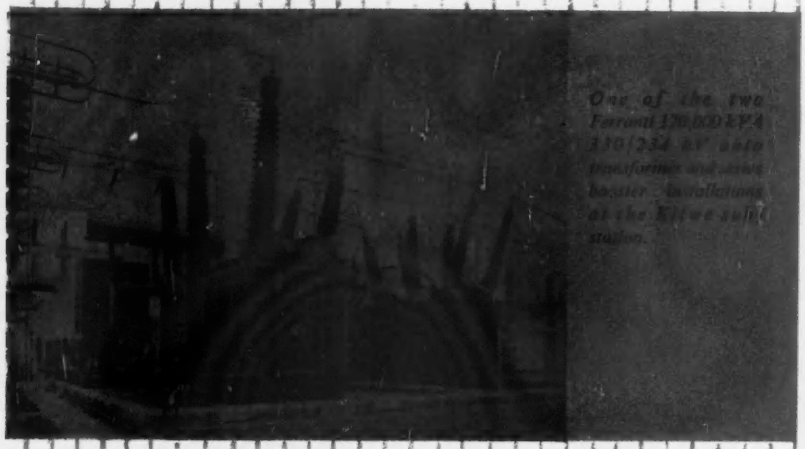
Specialist Makers of Electric Motors and Control Gear since 1883 NORWICH

ABERDARE PLASTIC INSULATED POWER CABLES

with pre-spiralled shaped conductors



Aberdare Cables



One of the two Ferranti 120,000 kVA 330/234 kV auto transformers and series booster installations at the Kitwe sub-station.

FERRANTI at KARIBA

Ferranti Summation Metering Panels for the Kariba Power Station.

The transformers and summation metering panels are for these sites.

TRANSFORMERS

All the sub-station transformers for the Kariba Hydro-Electric Scheme are being supplied by Ferranti Ltd. They comprise two 120,000 kVA, 330/234 kV 1-phase auto transformers with series boosters, eight 60,000 kVA, 330/88kV and four 60,000 kVA, 330/33 kV 3-phase double wound transformers. The transformer installations at Norton, Lusaka and Kitwe are complete. Work at Salisbury, Bulawayo and Sherwood is well advanced.

SUMMATION METERING

For the same scheme Ferranti Ltd. are supplying Summation Metering Equipment comprising: Precision grade integrating meters, Electro-mechanical summators, Printometer Demand Recorders and Suites of metering cubicles. These equipments will be used to meter six 100 MW generator sets at Kariba Power Station and also the supplies to the Transforming Stations at Kitwe, Norton, Salisbury, Lusaka, Sherwood, and Bulawayo.

The consulting electrical and mechanical engineers are Messrs. Merz & McLellan.

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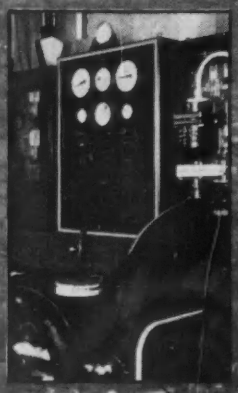
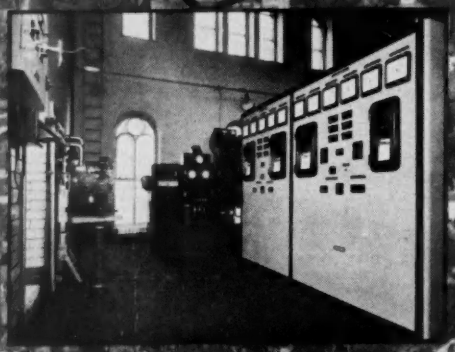
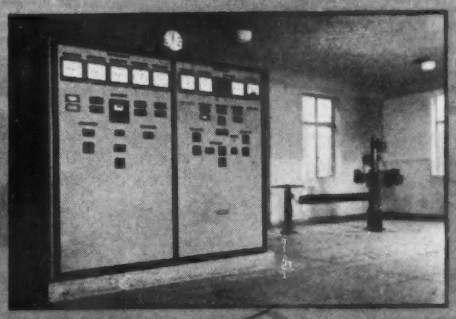




REMOTE INDICATION

for WATER ... OIL ... CHEMICALS



Evershed supervisory control units enable up to 40 plant functions to be remotely controlled over two wires—with indications and alarms operating in the opposite direction over the same two wires. The system is self-monitoring and constantly checks its own synchronization. It also provides for telephone communication—*again over the same two wires.*

The illustrations show panels in use at Colchester where remote and local water reservoir levels are indicated and recorded and distant control valves and borehole pumps are operated automatically. This telemetering system makes Colchester Corporation's Water Works one of the most up-to-date in Great Britain.

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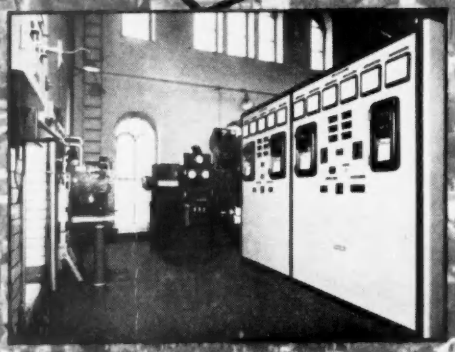

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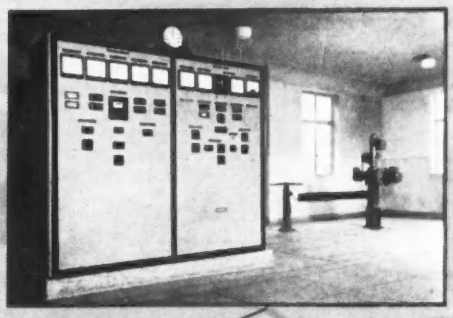
for WATER • OIL • CHEMICALS



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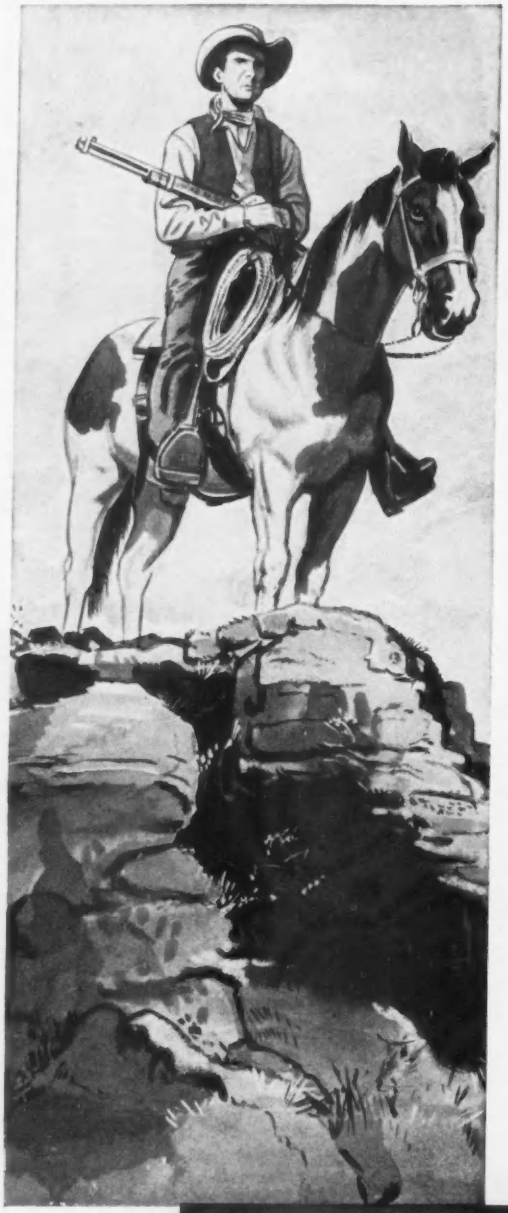
just a man, his horse and his Winchester...



Just as the Pioneer of the Old West was dependent on his horse and his Winchester rifle, so today's up-to-the-minute contractor has learned to recognize the dependability of his Ramset Jobmaster tool. This is because the Ramset tool is a product of the Ramset Fastening System and was designed by Winchester-Western. With the backing of such experience, it is not surprising that the Ramset Jobmaster is acknowledged as the premier tool of its kind on the market to-day—the only powder actuated fastening tool that is 100% Safe–100% Sure.

ONLY RAMSET OFFERS ALL THESE PRODUCT FEATURES AND SERVICES

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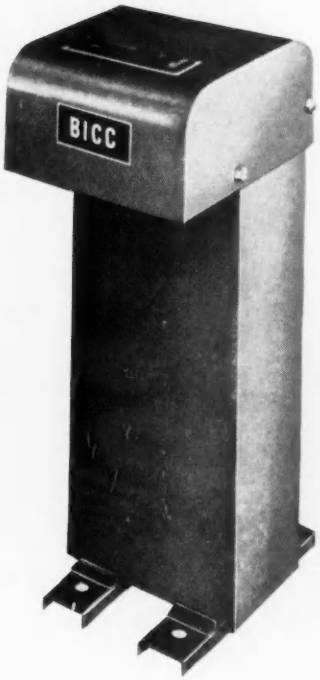
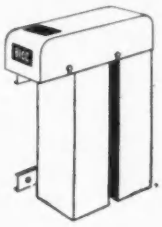
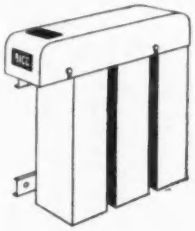
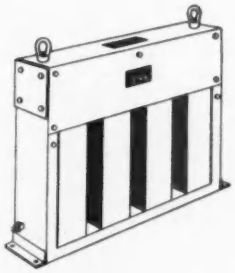




Simplified Unit Construction





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INTOL SB Rubbers are now produced in a range of eight grades of solid rubber and four latices. Please write for details.

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NEWS SHEET

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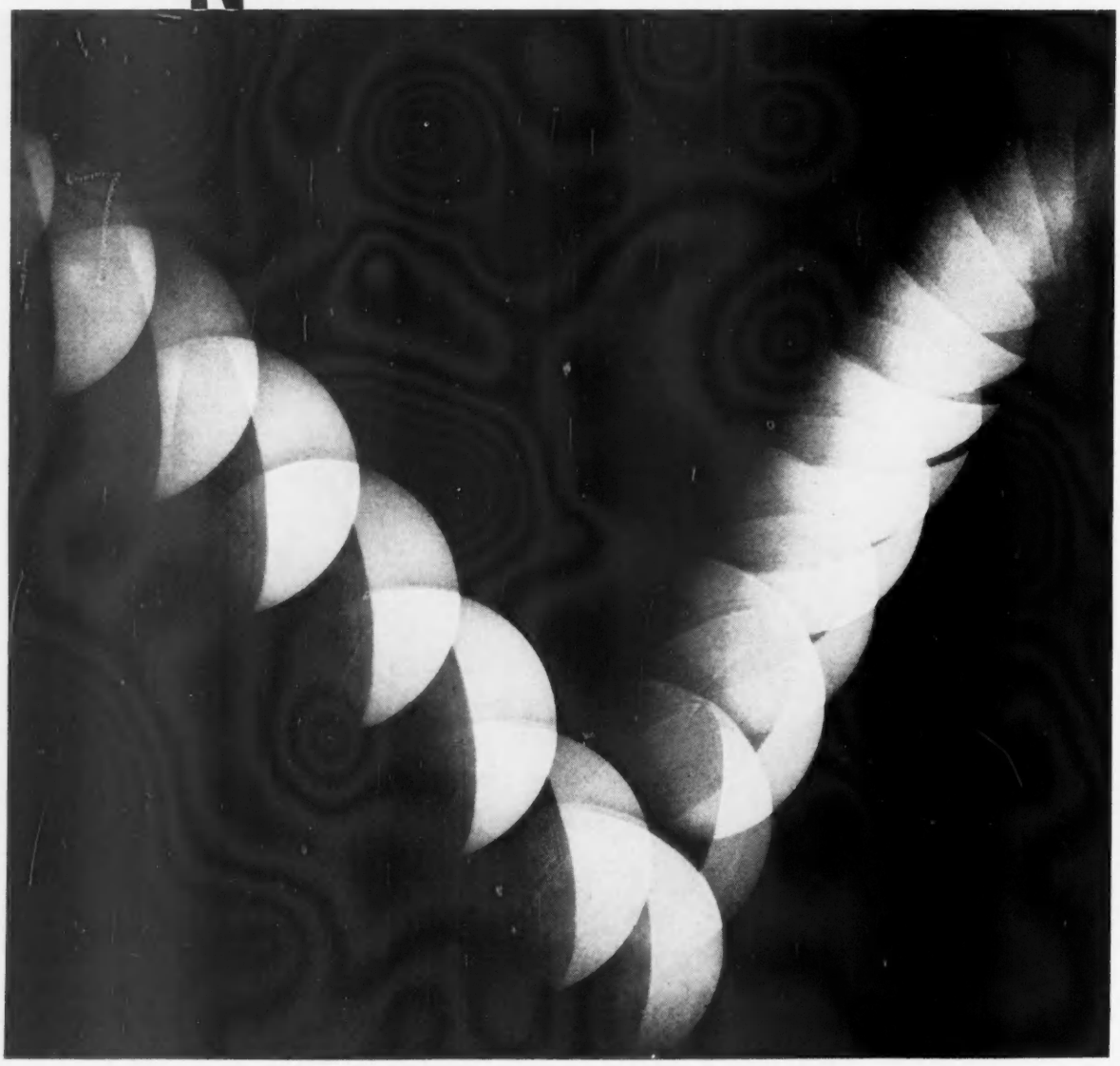

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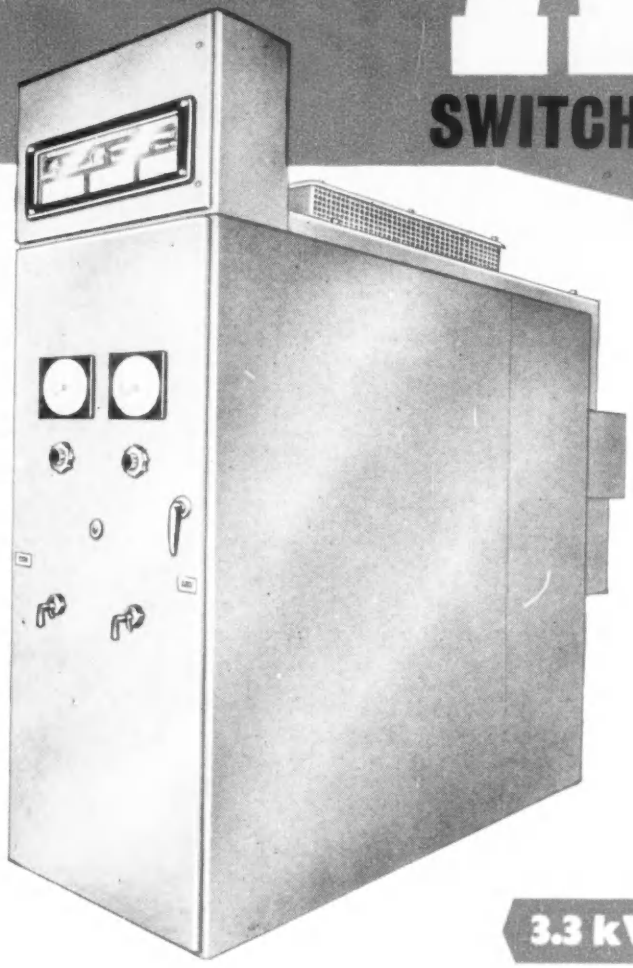
Air Insulated Air Break

TYPE **AH**

SWITCHGEAR UNIT



The Association of Short-Circuit Testing Authorities
ASTA
Certificate of Short-Circuit Rating
Crompton Parkinson Ltd. Short-Circuit Testing Station

3.3 kV. 150 MVA

The newly designed Type "AH" Switchgear Unit is air insulated and embodies an Air Brake Circuit Breaker which has been certified for a Rating of 150 MVA at 3.3 KV in accordance with A.S.T.A. Requirements 16 and 18.

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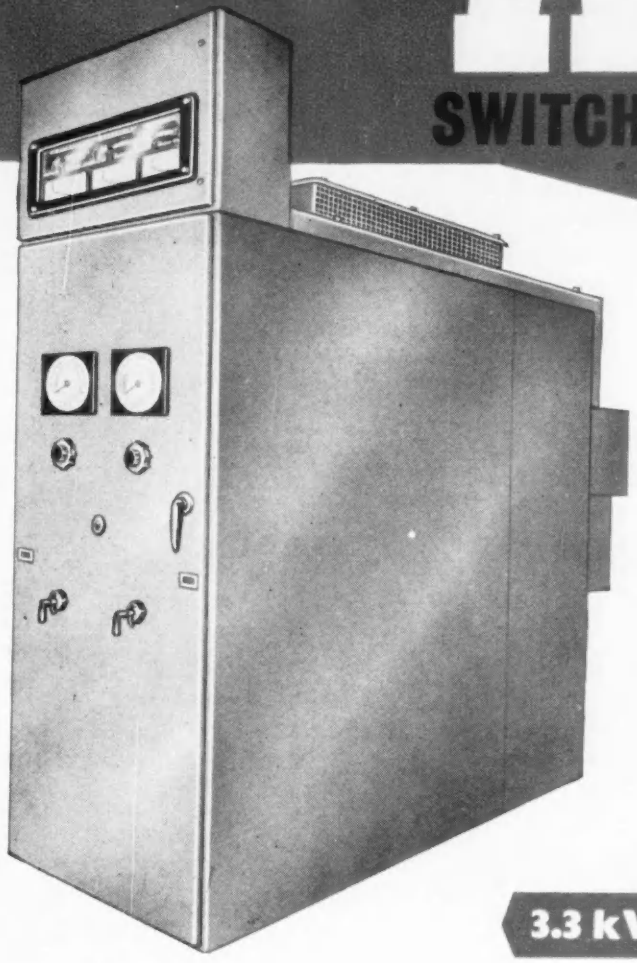

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Crompton Parkinson Ltd — Short-Circuit Testing Station

Dec. 8th January 1960

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THE TEN TOP FEATURES OF THE BELLING 48T
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• Vitreous enamel throughout including hob, door panels and side panels.

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Simply remove the small inspection panel on the back to gain access to the mains terminals. No need at all to remove back or sides.

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48AB without Auto-timer **£45. 15. 0**

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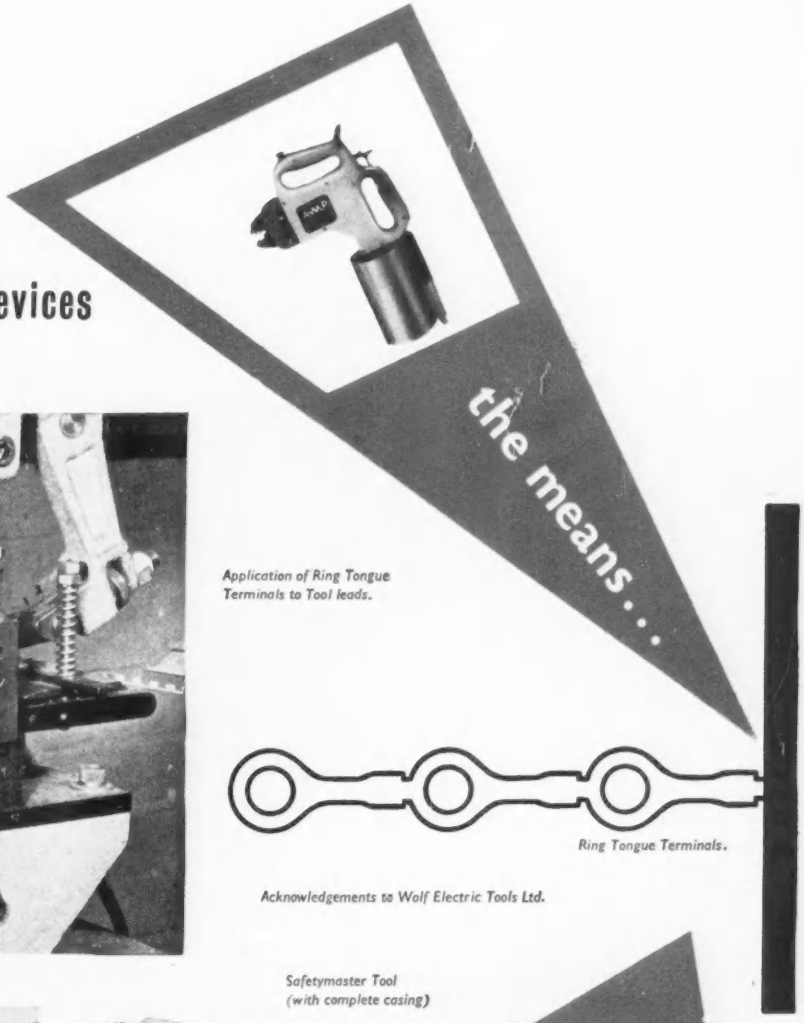
solderless wiring devices



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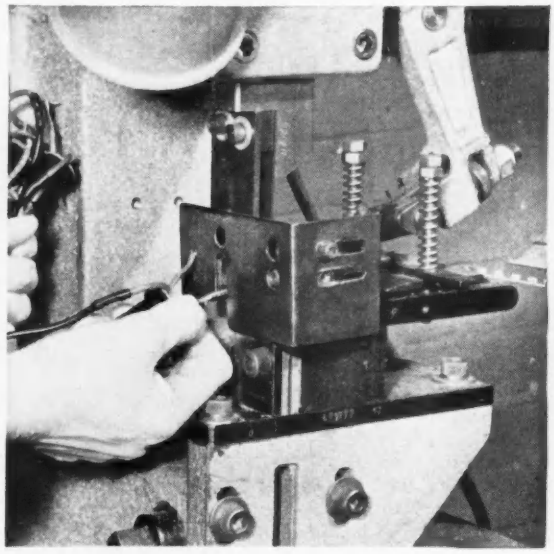
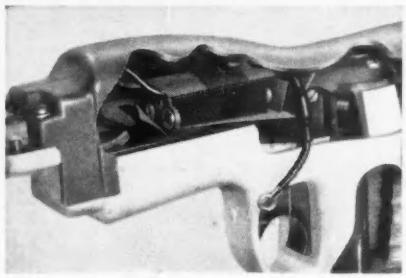


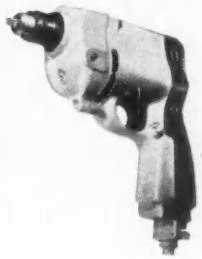
Application of Ring Tongue Terminals to Tool leads.

Ring Tongue Terminals.

Acknowledgements to Wolf Electric Tools Ltd.

Safetymaster Tool (with complete casing)





Close up showing Terminal fitted to lead suppressor.

. . . to the end

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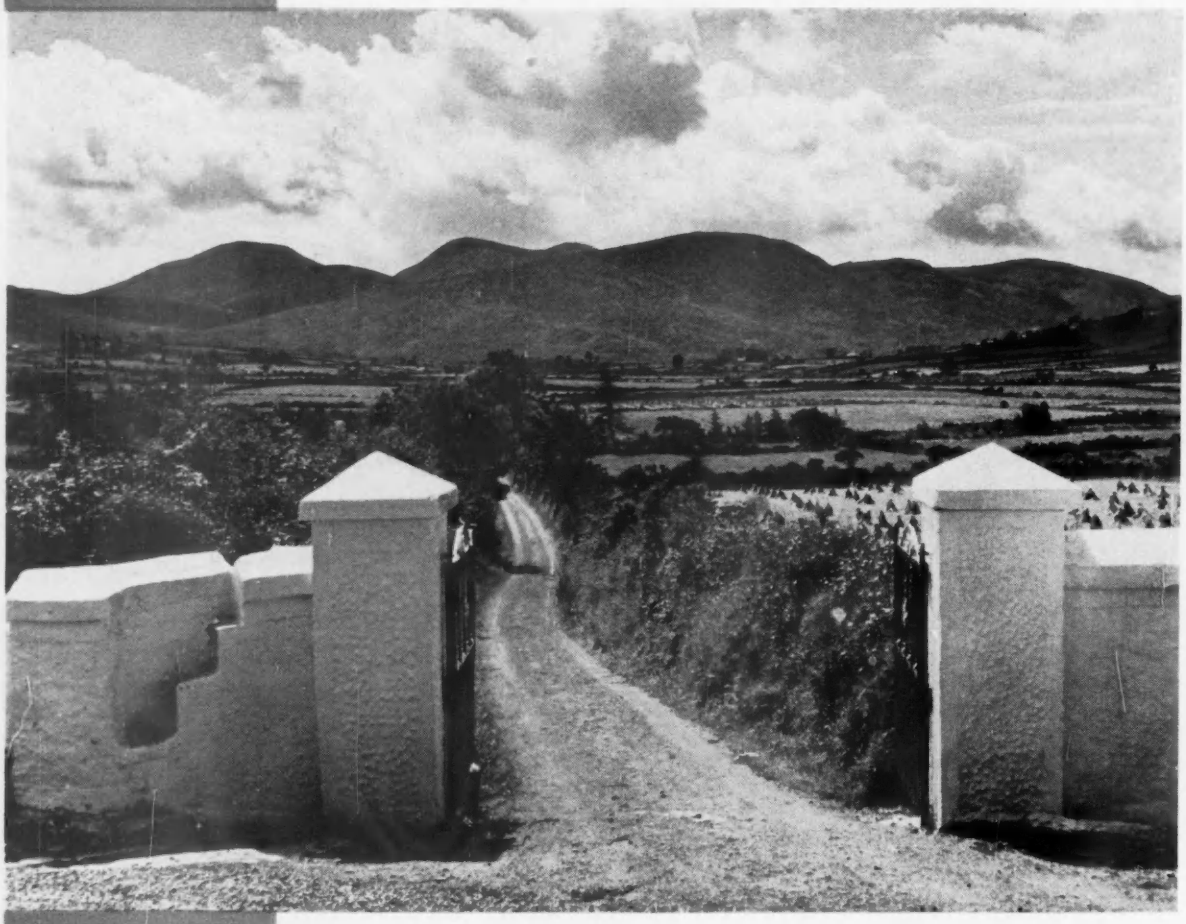
AP133

'Tis distance lends enchantment to the view,
And robes the mountain in its azure hue.

(Pleasures of Hope by Thomas Campbell)



By courtesy of Tourist Information Centre, Belfast

Irish cables are manufactured amidst scenery depicted above, showing the famous and beautiful Mourne Mountains.

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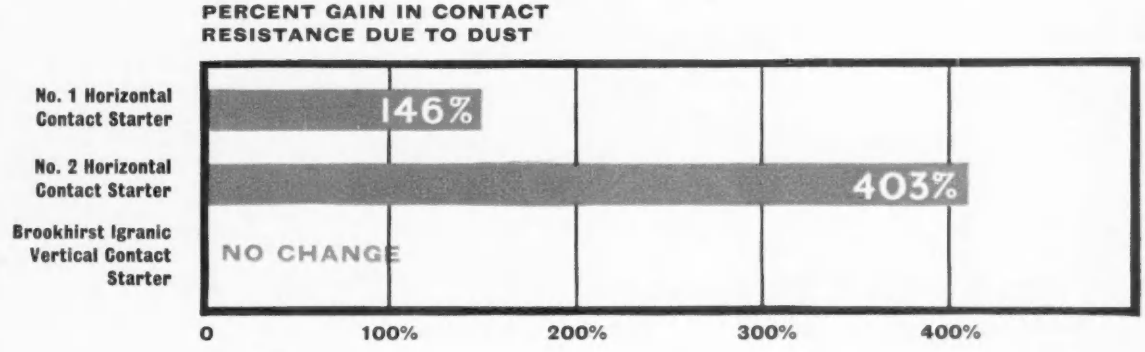
Vertical Contacts are
Dust Proof



A Brookhirst Igranic motor starter with vertical contacts was tested in a standard dust chamber along with two starters with horizontal contacts.

The Brookhirst Igranic vertical contact starter alone showed no increase in contact resistance due to dust deposits, because dust cannot collect on vertical surfaces. Increased contact resistance through dust leads to heating, pitting, wear, and failure.

Vertical DUST-SAFE contacts are Brookhirst Igranic standard.

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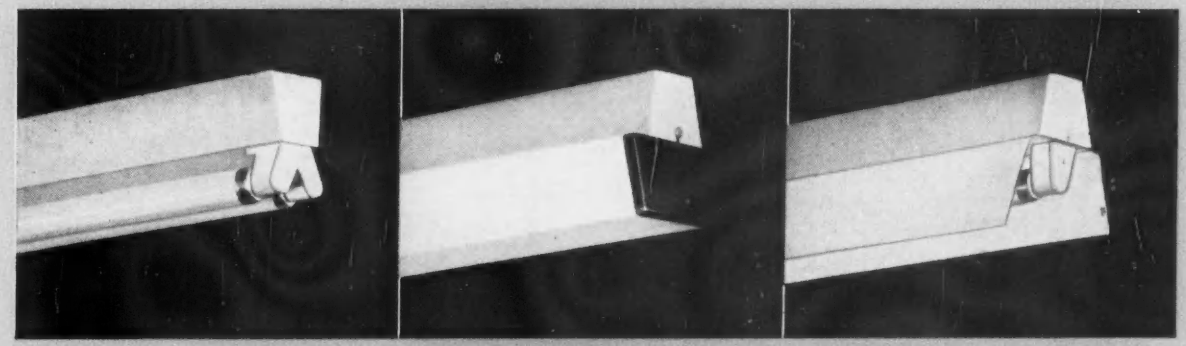

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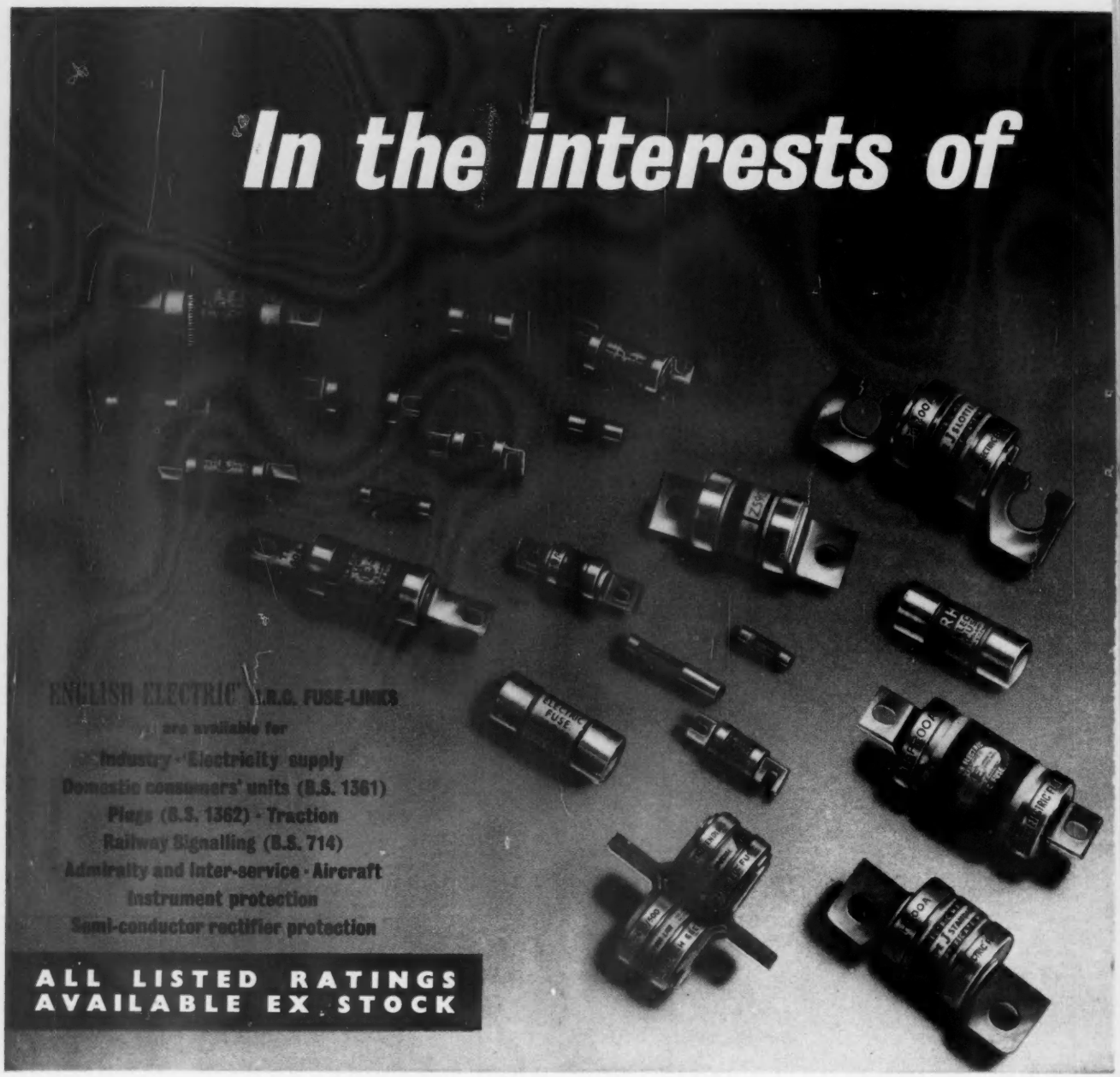

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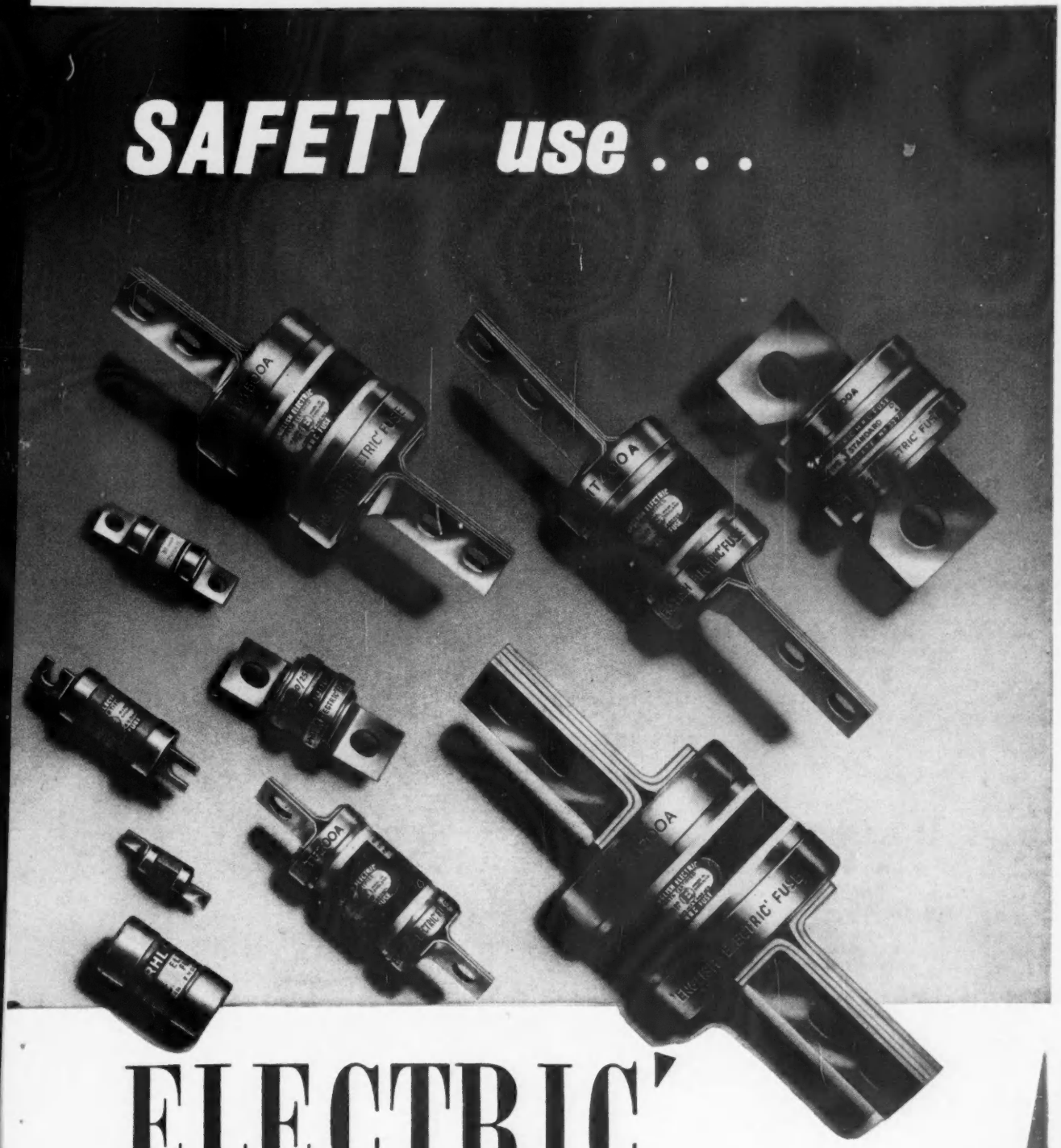

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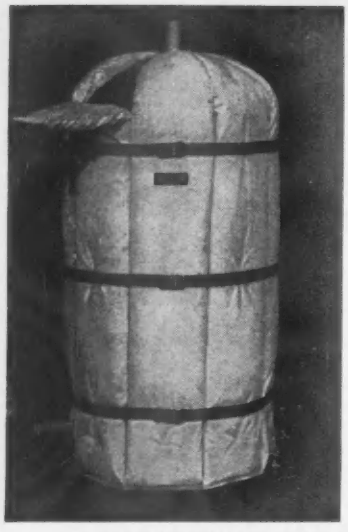

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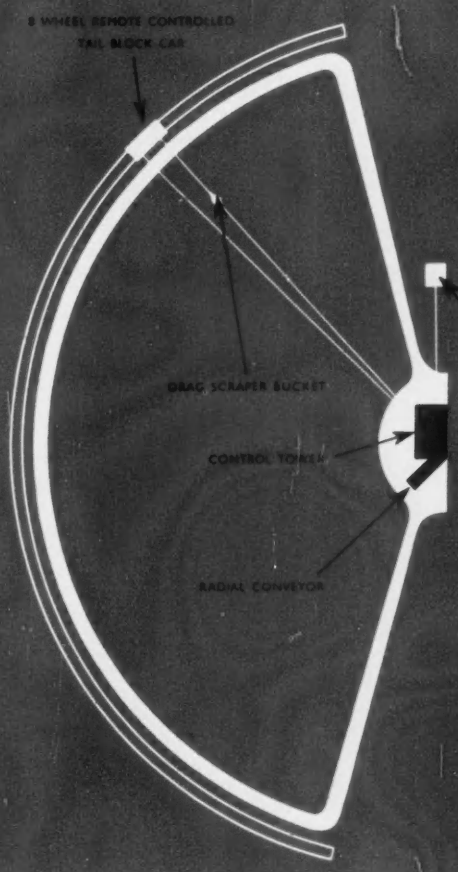
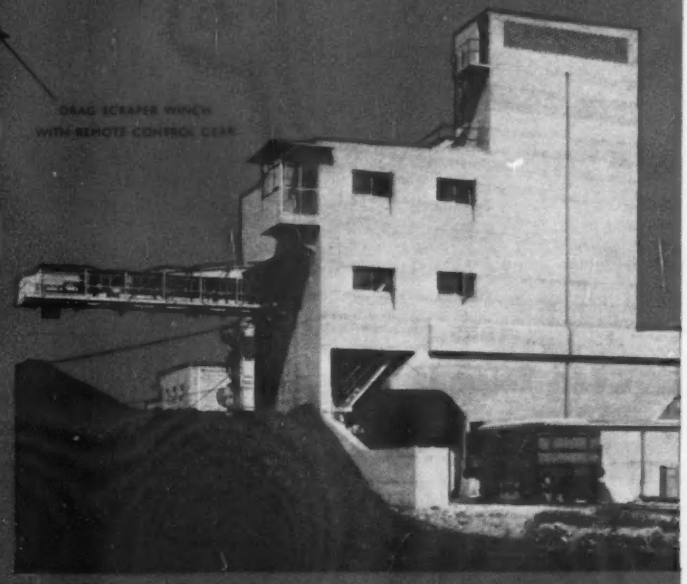
BEAUMONT DRAG SCRAPERS



An example of the Beaumont Drag Scraper system for stocking out and reclaiming coal, at one of the C.E.G.B. Power Stations. Here it forms an important section of the complete Coal Handling Plant which includes wagon tipplers, gravity bucket and belt conveyors supplied by International Combustion Products Limited.



The stocking out and reclaiming tower.

Drag Scrapers can be effectively applied to almost any shape of store ground and they have the advantage of simple control of Scraper Bucket and tail car by one man housed in a weatherproof cabin, with clear visibility of all operations. Standard designs are available for light, medium and heavy duties.

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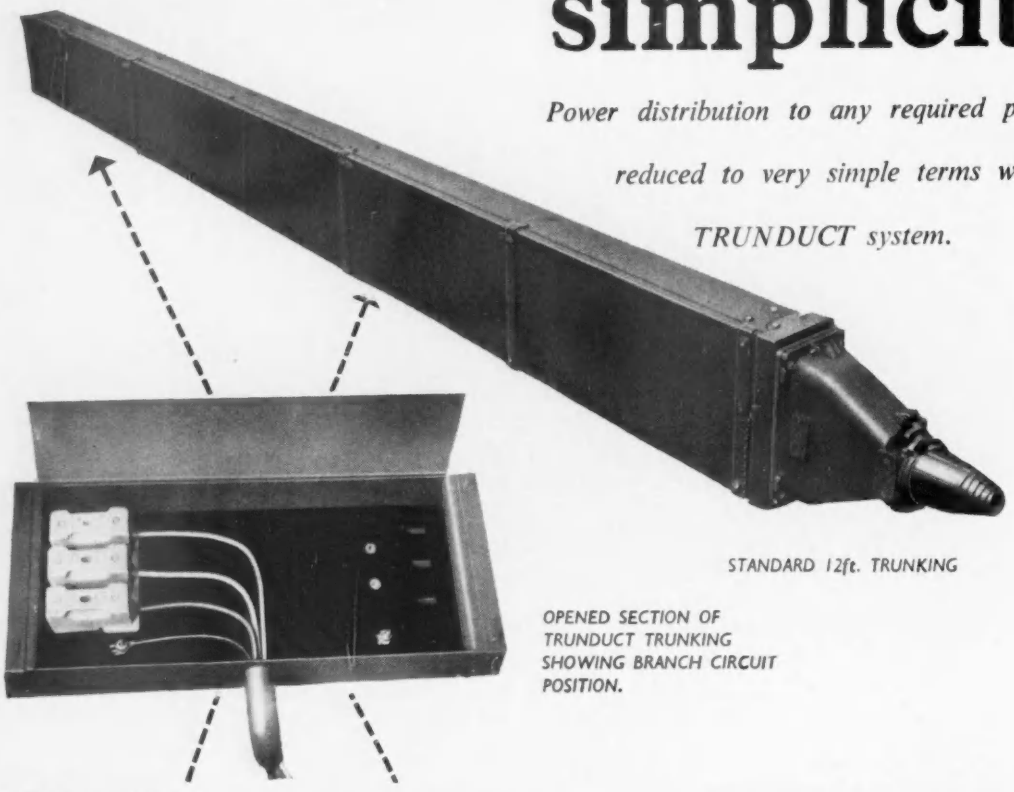

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OPENED SECTION OF TRUNDUCT TRUNKING SHOWING BRANCH CIRCUIT POSITION.

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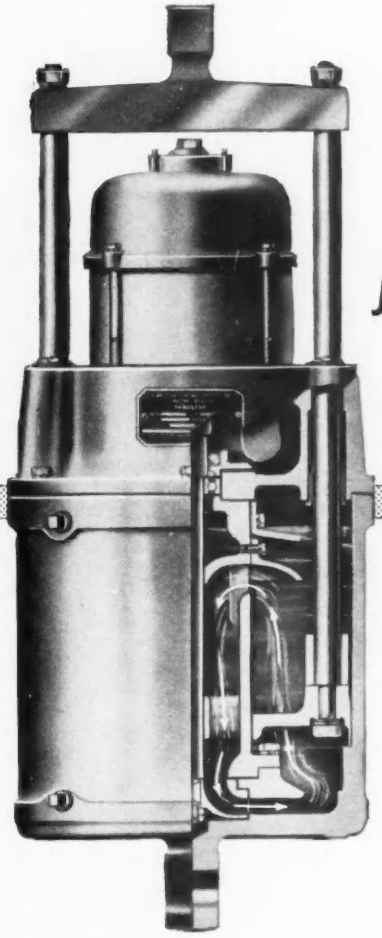
AEI Electro-Hydraulic Thrustors



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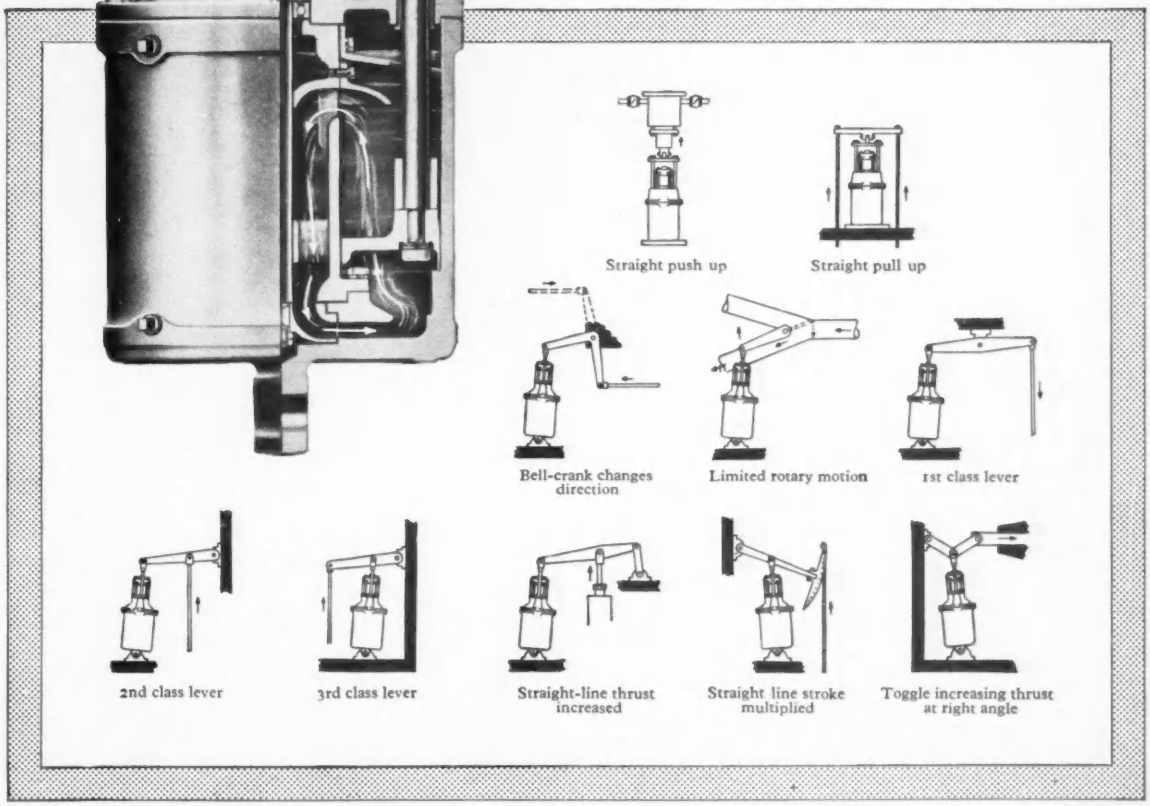

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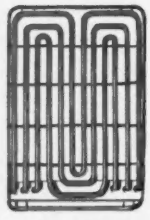
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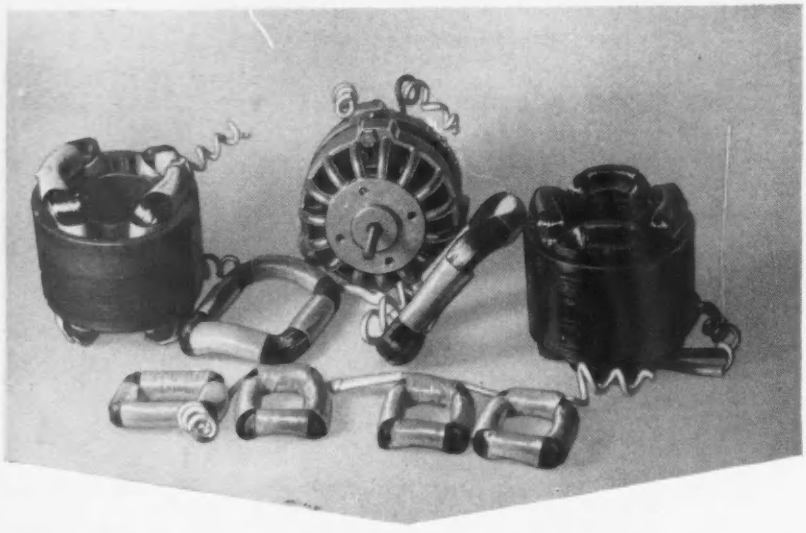
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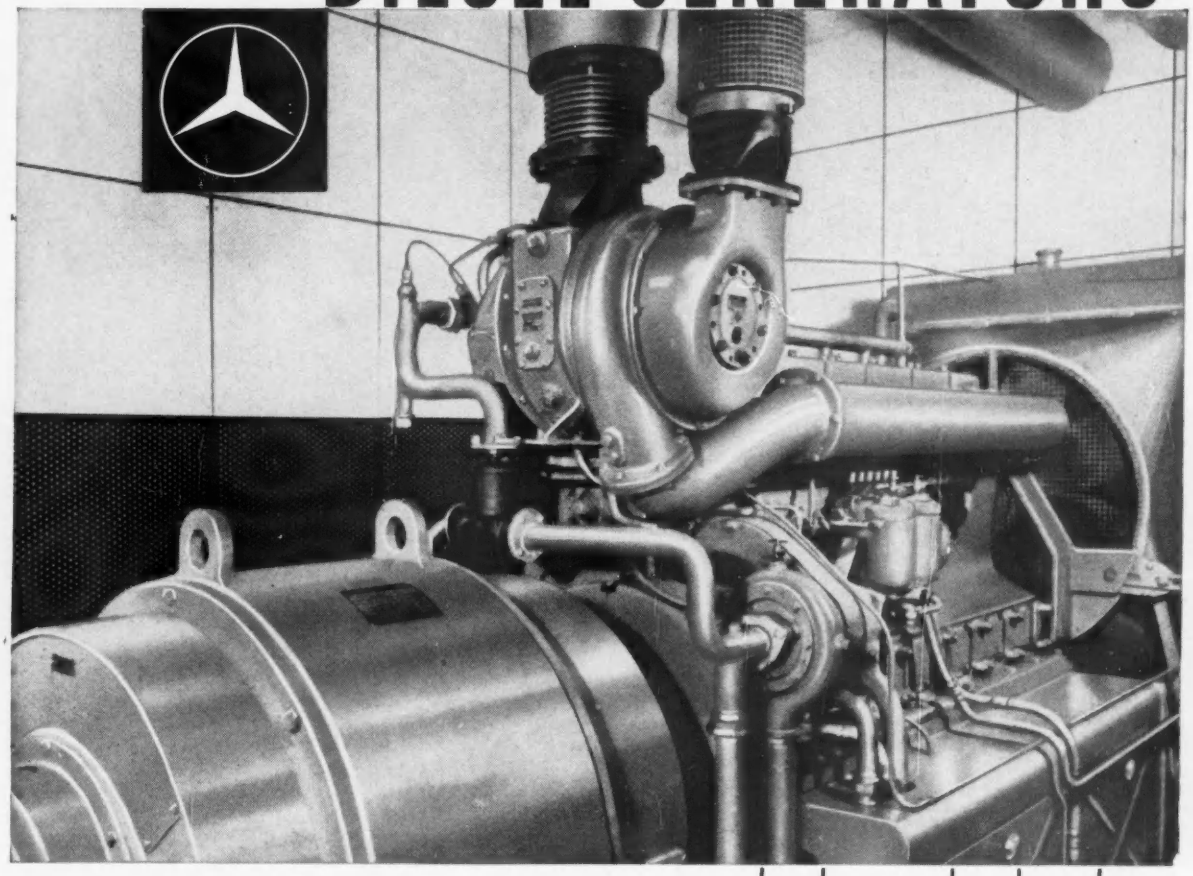

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36	OM 312	6	1500	1000
43	OM 321	6	1500	1200
78	OM 315	6	1500	1800
96	OM 326	6	1500	2000
127 182	MB 846 A	6	1000 1500	4000
167 235	MB 846 Ab	6	1000 1500	4200
190 260	MB 836 B	6	1000 1500	5300
250 360	MB 836 Bb	6	1000 1500	5500
305 470	MB 836 Db	6	1000 1500	5800
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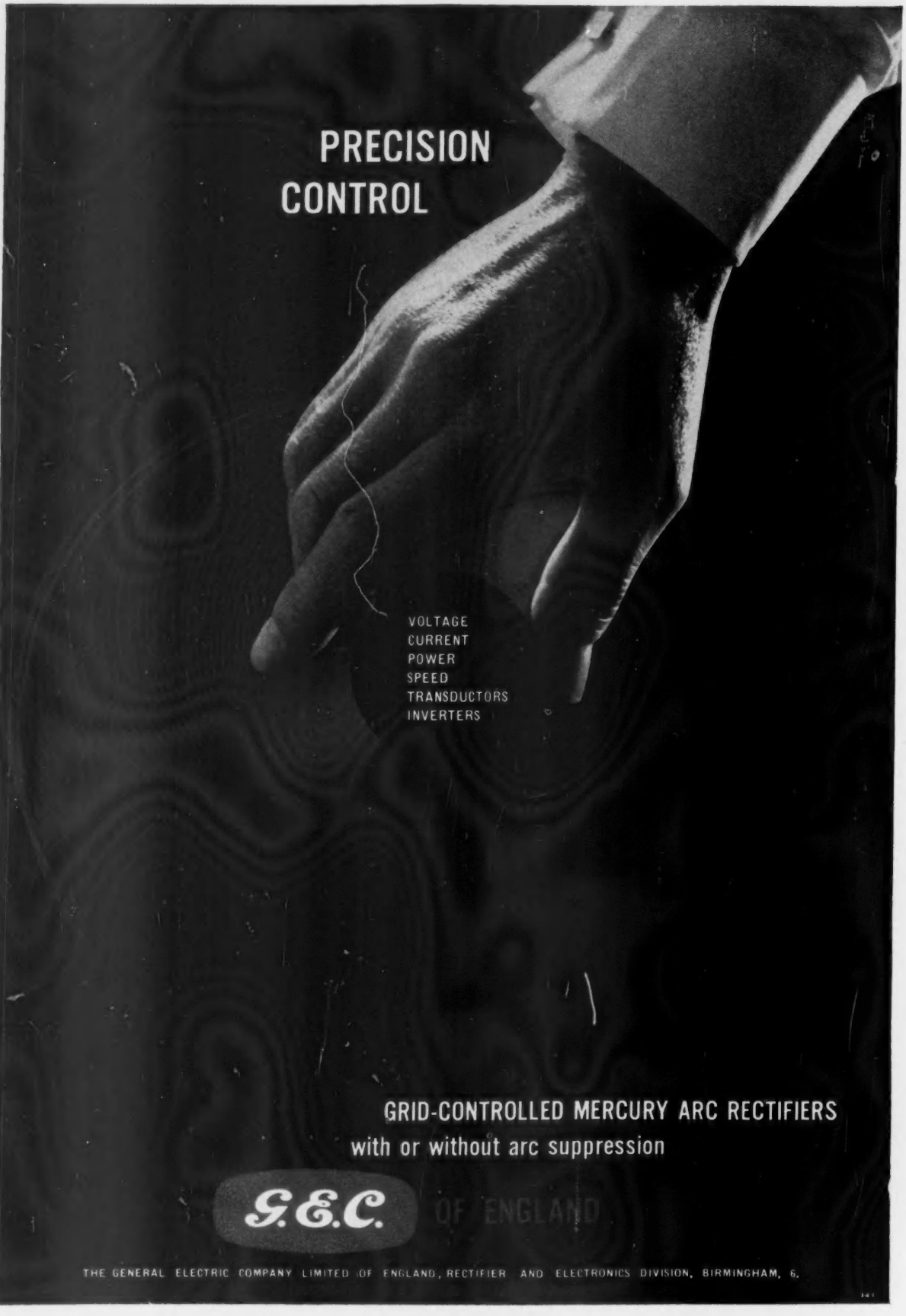
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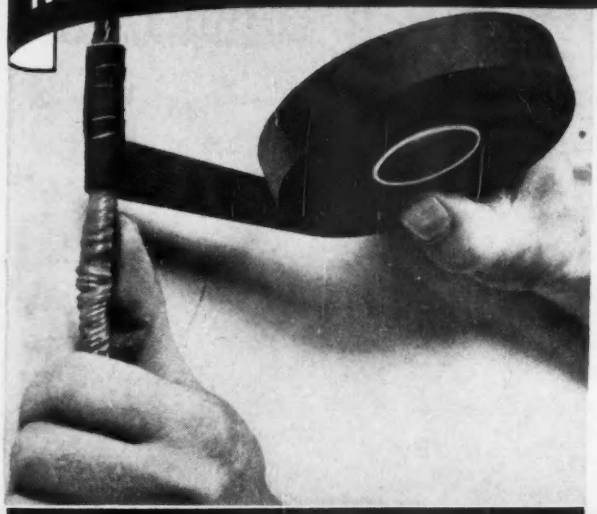
ROTUNDA 'SLIPKNOT' BLACK ADHESIVE ELECTRICAL INSULATING TAPE



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ADHESION before ageing test (BS.1078) 5.0 inches

ADHESION after ageing test (120 hrs at 82°C) 5.0 inches

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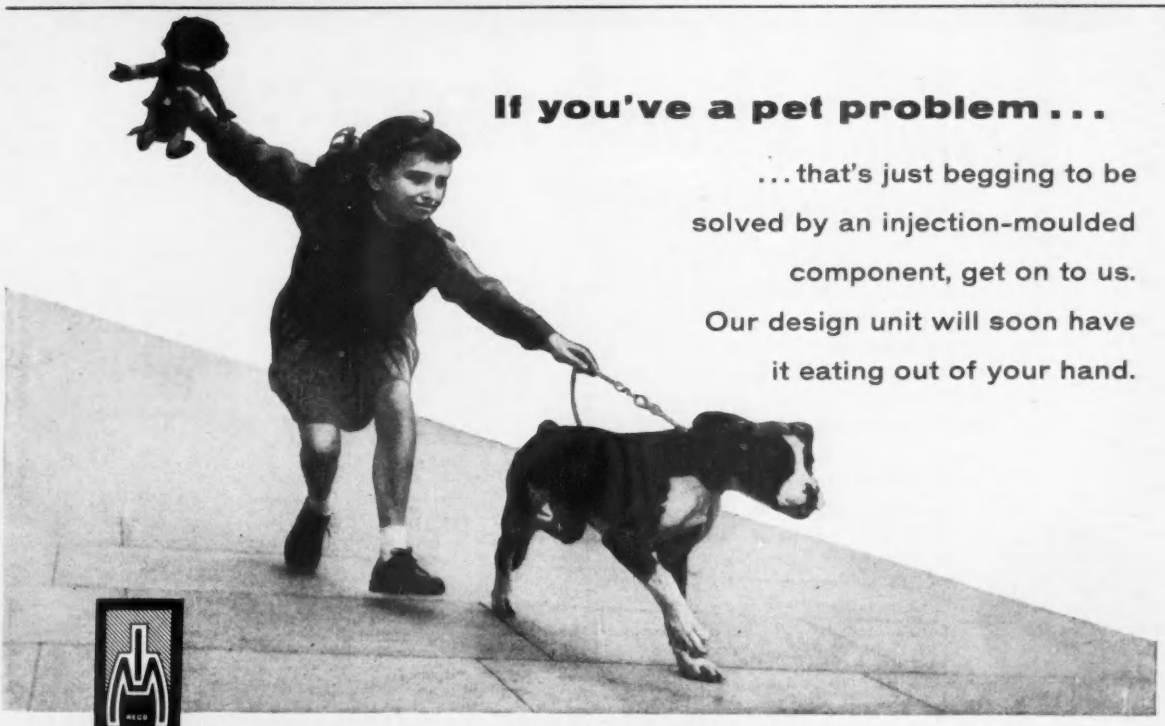

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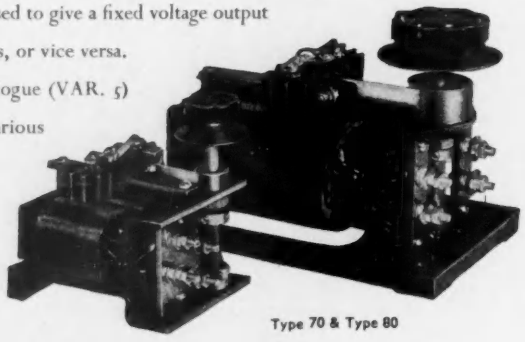
Page 13 of our catalogue (VAR. 5) shows the list of various windings available. May we send a copy?



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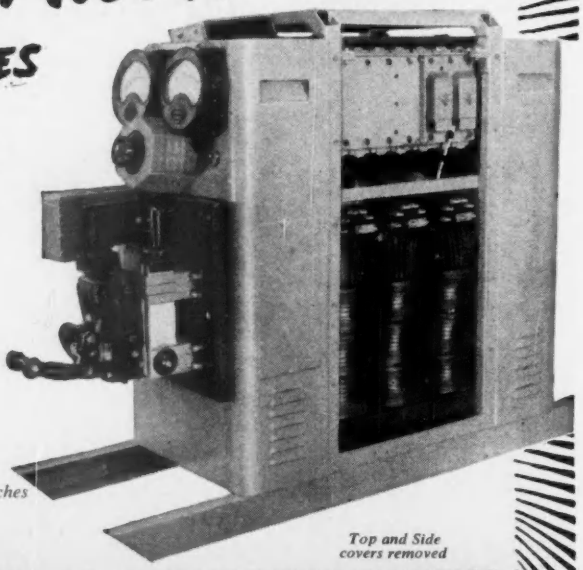

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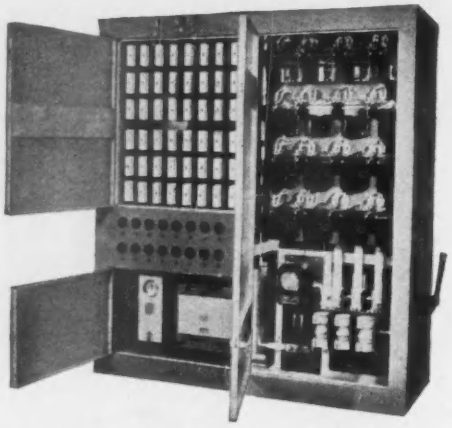

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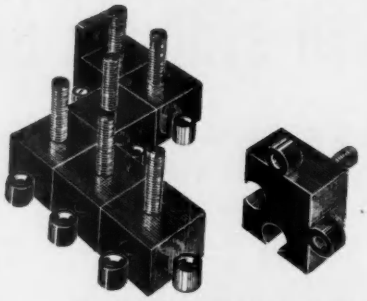

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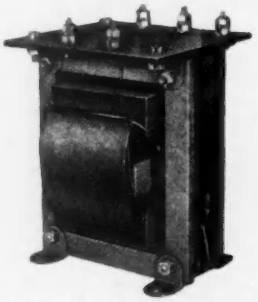

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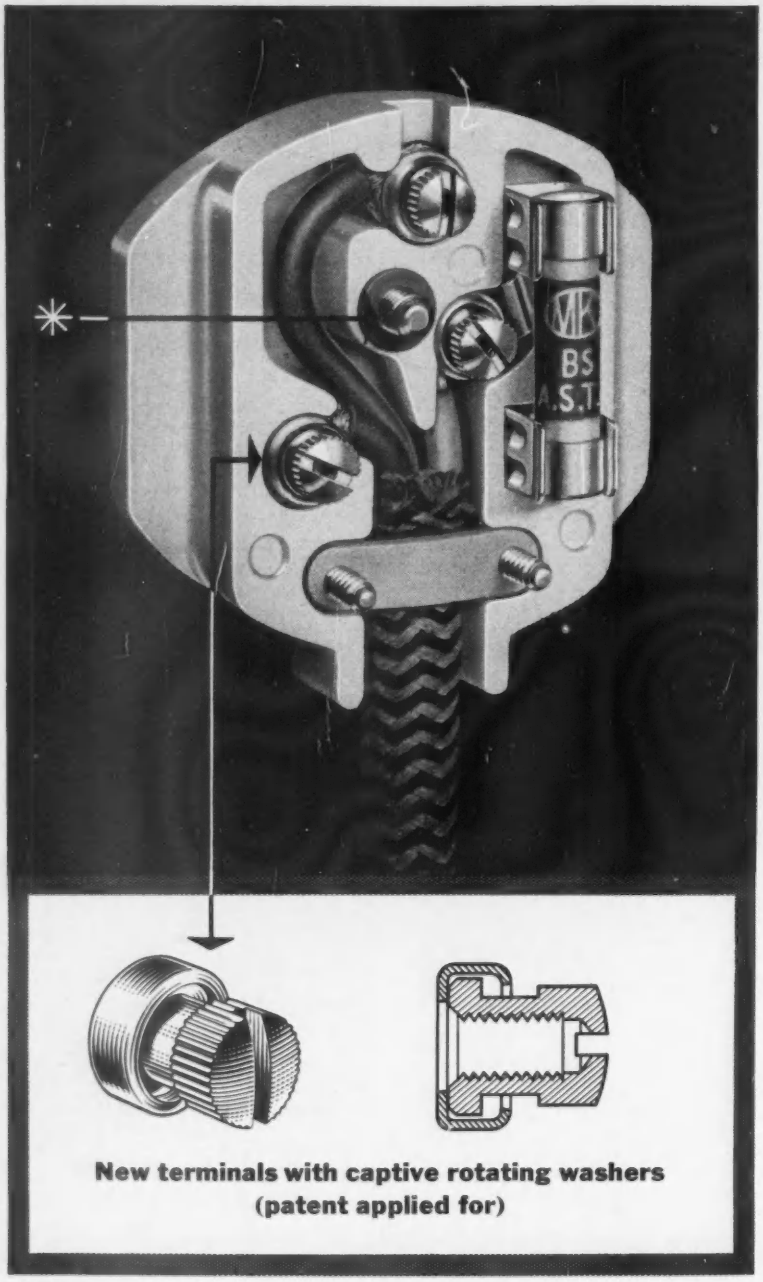

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THURSDAY 14 JULY, 1960
Registered as a Newspaper Volume 138 No. 2

ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telegrams: Equivolt . Estrand Telephone: HOLborn 6016

Dans ce numéro

Ventilateurs à air chaud pour le chauffage d'une église 43
Une nouvelle installation pour une église reconstruite utilise seize ventilateurs à air chaud de 10 kW, disposés dans des fosses au-dessous du plancher de l'église. Pour éviter le bruit pendant les services religieux, certaines dispositions ont été prises afin de réduire la vitesse des ventilateurs, par l'insertion d'inductance en série. Le courant d'air est ainsi diminué jusqu' à 30% environ, tandis que le niveau du bruit ne dépasse pas 12 dB. Les frais d'installation furent d'environ £13 par kW., y compris les fosses et grilles. Le coût annuel estimé pour chauffer le nef est de £65, plus £10 à £15 pour les chapelles latérales.

Adoption de l'éclairage fluorescent dans les écoles 46
Un vaste programme d'amélioration de l'éclairage dans les écoles est en cours à Blackpool, où 31 écoles ont des niveaux moyens de 64,5 lm/m^2. Des lampes fluorescentes ont été utilisées dans tout l'ensemble, afin de porter les intensités lumineuses aux niveaux requis, sans augmenter le courant, évitant ainsi la nécessité de refaire les câblages de l'installation électrique existant déjà.

Problèmes des grands auto-transformateurs 49
Le rapport sur CIGRE continue avec des notes sur les groupes de discussion sur les transfor ateurs et les tours. Parmi les aspects des grands auto-transformateurs à haute tension dont il fut discuté, il faut signaler les méthodes de protection contre la surtension et leur comportement sous l'effet de courts-circuits. L'adoption générale d'essais en onde coupée ou front d'onde n'a apparemment reçu que peu d'appui. Des bacs scéllés à huile et a circuits magnetiques collés furent aussi considérés. La discussion sur les tours comprit des descriptions de techniques de préfabrication utilisées pour les fondations en Finlande et en Pologne, et les tours tubulaires employées en Ecosse.

In dieser Nummer

Elektrische Ventilator-Luftheizungen in Kirchen ... 43
Eine neue Heizungsanlage für ein wiederaufgebautes Kirchengebäude umfasst sechzehn Stück 10 kW-Gebläse Luftheizapparate, die in Vertiefungen des Fussbodens eingebaut wurden. Um das Geräusch der Apparate während der Gottesdienste zu vermindern ist für eine steuerbare Herabsetzung der Gebläsedrezahl mittels in Reihe geschalteter Drosselspulen Vorsorge getroffen. Auf dieser Weise kann die Luftströmung auf etwa 30% des Normalwerts und der Geräuschpegel auf weniger als 12 db reduziert werden. Die Investitionskosten der Anlage einschliesslich der Bodenvertiefungen und Abdeckgitter betrugen ca. £13 pro kW. Die geschätzten Betriebskosten betragen £65 im Jahr für das Hauptschiff zuzüglich £10 bis £15 für die Seitenschiffe.

Umstellung der Schulbeleuchtung auf Leuchtröhren 46
Eine grosszügige Modernisierung der Schulgebäude-Beleuchtung wird gegenwärtig in Blackpool durchgeführt, wo die Lichtstärke in 31 Schulen bisher im Durchschnitt weniger als 64,5 lm/m^2 betrug. Im Zuge der Modernisierung werden durchwegs Leuchtröhren verwendet, damit die vorgeschriebene Beleuchtungsstärke ohne zusätzlichen Stromverbrauch und daher ohne Leitungsaustausch erreicht werden kann.

Probleme im Betrieb grosser Autotransformatoren ... 49
Fortsetzung des Berichts über die C.I.G.R.E.-Tagung mit Notizen über die Beratungen der Diskussionsgruppen für Transformatorenbau und den Bau freitragender Masten. Mit bezug auf grosse Hochspannungs-Autotransformatoren wurden u.A. Methoden des Ueberspannungsschutzes und das Verhalten solcher Transformatoren unter Kurzschlussbeanspruchung diskutiert. Man war im Allgemeinen gegen eine weitere Ausdehnung des Anwendungsgebietes für die zerhackte Wellen- und Wellenstirnprüftechnik. Zur Diskussion standen ausserdem Oeleinschlussysteme und Verbundkerne. Die Diskussion über freitragende Masten befasste sich u.A. mit finländische und polnische Fundamentbauweisen, die auf der Anwendung vorgefertigter Bauelemente beruhen, sowie mit den in Schottland zur Aufstellung gelangenden Rohrenmasten.

Heating and the Modern Church 43

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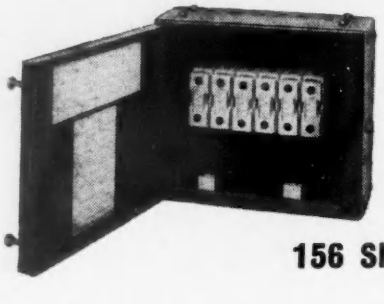

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ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY, 14 JULY, 1960

Editor and Managing Director:
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News Editor:
T. W. WRIGHT

Comment

HIRE-PURCHASE LOWER

After the April restrictions on hire-purchase, the May trading figures published last week take on a special significance. No-one doubted that there would be a fall; the question was how much? Total sales by independent radio and electrical retailers show a fall of no less than 13% on the previous month and 6% on the corresponding figure for last year. A study of the statistics shows that this must have been wholly due to the effect of hire-purchase restrictions; indeed, the figures convey the suggestion that there has been a slight increase in cash sales over the previous month. This group of radio and electrical equipment has been harder hit than any, save only that of motor-cars, and although radio seems to have suffered more than electrical appliances, when seasonal influences are ironed out the indications are that radio has not done quite so badly as its near neighbour. Neither, would it seem, have department stores suffered as much as independent retailers, although detailed figures are not available; this would follow from the recent trend in the balance between the two. Possibly the worst hit of all are the appliance manufacturers, certainly recent events support such a view. Prior to the hire-purchase restrictions, substantial stocks had been built up in the pipeline and these are now being worked down, so that factory orders have suffered on this count also, as well as from increasing overseas competition. The trading response to the new h.p. restrictions has been almost frighteningly sharp; here is a more powerful financial weapon than many thought and one unequal in its incidence. But the economy is already swinging the way the Chancellor wanted, so perhaps the latter part of the year may bring some amelioration.

SUPPLYING THE MARGINAL CONSUMER

In countries with low general economic standards the task of bringing electricity supply to the masses is impossible of solution without a general raising of the standards of living. As standards are raised, however, there is created a class of prospective consumers unable to afford a full supply, yet desirous of possessing some of the facilities electricity can offer. To meet the need of such a marginal class of consumer, authorities in Africa are developing special techniques of supply. Recently, the Uganda Electricity Board has taken the enterprising step of introducing a special form of supply available on a fixed monthly charge. The supply will consist of a locally made consumer's unit costing no more than 60s and comprising a lamp bracket complete and a single socket-outlet under control of a current-limiter and main switch. This is suggested as sufficient to provide for a

radio or additional table lamp, while a larger consumer's unit will also be available which will permit the use of small domestic heating appliances. The flat charge of 8s 6d a month for a 1 A supply, or 20s for 5 A, avoids any uncertainty of running costs which the Board aptly refer to as "meter fright," a factor which they consider to be an inhibiting one amongst this class of consumer. Although the facilities offered are limited, they avoid the cost of internal wiring, but the normal service charges will have to be met. Initial experience with this service suggests a good potential demand and it is hoped that such supplies will encourage the eventual adoption of normal installations. One of the attractions of the scheme appears to be the ability to operate a mains radio; so once again it looks as though radio (or television) is proving one of electricity's best salesmen. Will it always be so, with the increasing use of transistors?

RESEARCH IN RUSSIA

Confirmation of the priority that is given to research in Russia comes from the British delegation on welding that returned from Russia last week. Reference was made to three institutes, with 1,300 engaged on fundamental welding research; nothing equivalent to this is to be seen in the Western world and no country is spending the same amount of effort. However, no research or development work appears to be carried on in the factories, it is all concentrated in the institutes. These work on problems submitted to them by the factories and are responsible for seeing that new techniques are introduced into the factories. They appear to charge 15% on the plant for their service. Impressions of the techniques employed in the factories do not seem to have been so sweeping and the differences in practice between the two countries do not seem to be so great. Delegates indicated that there was a large technical gap between the work carried out in the research institutes and the practices on the shop floor. They were confident, however, that this gap would eventually be closed. For the full technical details of the techniques studied the full written report must be awaited, but all delegates seemed convinced of the technical value of the visit and of the hospitality they received. This was the first visit arranged by BEAMA under the agreement reached last year by the British Council for cultural and technical exchanges. Clearly it should not be the last.

BONDING OF TRANSFORMER LAMINATIONS

New materials lead to new techniques: thus the advent of cold rolled grain oriented steel, which has already brought modifications in transformer core design, when combined with the modern advances in plastics has led to the possibility of solidly bonding the laminations so as to form an integral core. This technique has already been applied to small generators and three-phase transformers up to 10 MVA and results of three years' service are said to be satisfactory. The advantages of such a method are obvious. The elimination of bolt holes in the limbs and a reduction in the number in the yoke, together with the use of a maximum core pressure less than that used with conventional cores, enables losses to be reduced by 18% to 22%. Also, the difference between actual losses and calculated figures has proved much smaller, enabling the designer to work to closer margins. Noise, that ever-present problem in urban installations, is said to be reduced, particularly so at the lower flux densities. In some way there appears to be a reduction in the magnetostriction effect, though the theory of how the bonding of the laminations should have such a result has not been resolved. A price must be paid for these advantages. The addition of a bonding medium, even though it be of low initial viscosity, will reduce the lamination factor. Using phosphatised steel sheets it is suggested that the maximum reduction of lamination factor is of the order of 1·0-1·5%. This new Swiss development, which was described at the recent CIGRE meeting, aroused surprisingly little comment. Perhaps it was a case of reserved judgment on the bonding life of the plastics used and a feeling that there was nothing like steel. British engineers may have been more particularly worried about the use of such a technique with the poor tolerances of the steel sheet they are having to use. Yet this development is a natural one, which demands the closest attention.

THE CYPRUS SETTLEMENT

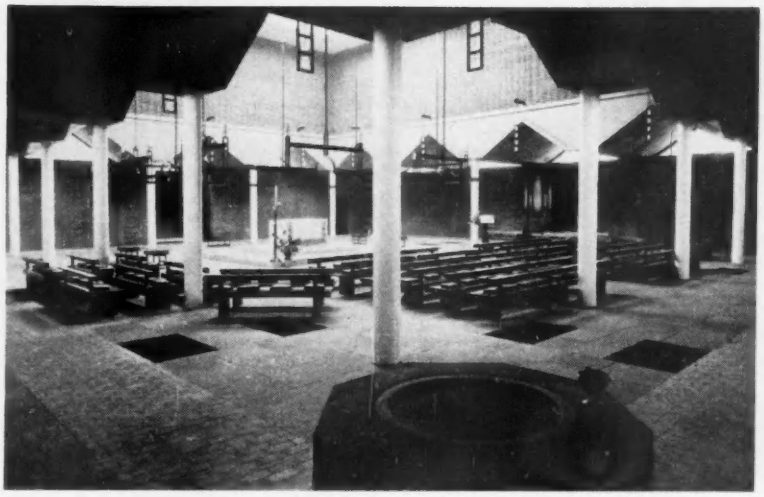
So interwoven is the supply of electricity in our modern society that there can be few political developments that do not have electrical repercussions. So it is with the settlement in Cyprus. Under the terms of the recent agreement, the Electricity Authority is to be handed over lock, stock and barrel to the new Republican Government. Such was an inevitable decision, but one which takes little cognisance of the excellent work that has been done by the Authority in its short existence in extending supply into the less populous areas of the island, particularly during the troubled times of the past emergency. Nor is that all. The UK Government has given a promise that at the request of the Cyprus Government a loan will be made towards further extension of electricity supply within the island. Such a suggestion may remind area board chairmen with large rural systems of Gilbert's lines: "One for you and one for thee, but nary a single one for me." One safeguard concerning electricity supply is written into the Cyprus agreement. If the Dhekelia power station, which stands on republican territory, for any reason fails to provide adequate supplies for British use, it may be taken over by British personnel. Such a clause could prove to be a double-edged one.

Meteor

This week's quick summary of electrical news faces advertisement page 8.

Heating and the modern church

ELECTRICAL HEATING AT ST. PAUL'S, BOW COMMON



MOST churches are large buildings of massive construction occupied fully for only a few hours in each week and this pattern of use creates a difficult heating problem.

Any system of heating which depends upon warming the structure of the building must be uneconomic and various systems have been tried in the course of the years. At first sight, electricity appears to offer considerable advantages owing to the possibility of achieving a short heating-up period. In the past, interest has been concentrated on four systems: electric heating tubes which can be used only where there are fixed pews or stalls, embedded floor-heating which is superficially attractive but has the disadvantage of a long heating-up period, thermal block storage heaters which are often difficult to site and again require a lengthy pre-heating period and, more recently, overhead radiant heaters have been used. From the engineering point of view the latter have several advantages but in many churches their appearance would be unduly obtrusive.

The following article describes an electrical heating installation in a church in which, owing to its form, none of the above systems could be installed. In the upshot, it appears that there is no reason why this method, although developed for an unusual type of church, could not be applied to a much wider range of church buildings. It is, therefore, described as a matter of general interest.

St. Paul's, Bow Common

The heating installation in the recently reconstructed church of St. Paul, Bow Common, comprises 16 10 kW fan heaters located in eight pits beneath the floor. This method has been used on previous occasions for pre-heating church interiors but has rarely been employed as the sole means of heating, largely because the noise made by the fans has necessitated their being switched off during the service.

In this installation the noise difficulty has been overcome by star-connecting each heater battery, having a "reduced heat" position with one phase of the heater turned off and the fan speed cut down by 30% by the insertion of a pre-set choke. At the lower speed the air flow is reduced by 30% only, while the noise level is reduced by about 12dB so that it should be quite possible to run the fans at low speed during the course of a service.

The Building

The new church, which replaces an earlier one destroyed by enemy action in World War II, was consecrated last Easter. The interior is shown on this page and a plan and sections through the building are indicated in Figs. 1 and 2. As may be seen, the design does not easily lend itself to heating by any of the more usual systems, such as water radiators, electric tubular or overhead radiant heaters.

The altar is just east of the centre of the nave and it is intended that the seating for the congregation shall be movable to suit the requirements of different services. No form of heating fundamentally tied to a particular seating plan was, therefore, permissible. From a preliminary inspection, it appeared that heating from pits below floor level was an idea worth exploring provided only that the noise problem could be solved. The concept

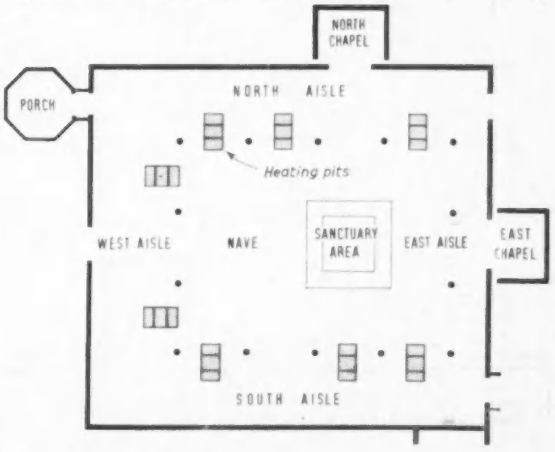


Fig. 1. General plan of the church of St. Paul, Bow Common, showing the situation of the pits with fan heaters

of dual fan speed and the related control circuit were then developed.

The heaters must be controlled by contactors as they include thermal trips whose function is to turn off the supply in the event of failure of the fan, so contactor control for this purpose was combined with the dual speed control.

The three sections of each heating unit are connected in star across the three phases and are separately switched by two relays. The first, a triple-pole relay (A in Fig 3), controls two sections of the heating element and the supply to the fan motor; the second, a double-pole relay (B in Fig. 3), controls the third section of the element and shunts the choke in the fan-motor circuit. The thermal trip is included in the common neutral line to the two relays controlling each heater, not an ideal arrangement but one thought to be adequate in the present case in which the standard of wiring is high and the installation is regularly tested and serviced. A time-switch, to which we shall refer later, is inserted in the live relay-line. For more general use, or where control over the standard of installation and servicing cannot be so close, it would be better to use the circuit in Fig. 4 where A is a four-pole relay with the thermal trip in the live line and the fourth pole masters the supply to relay B. For ease of installation and servicing, all the relays, chokes, fuses, etc., are enclosed within a sheet steel cabinet with numbered terminals for connections.

The heating units are installed in pairs in each pit, the whole installation being controlled by a single four-position rotary switch providing the following facilities:

(1) Full-heat, all fans at maximum speed.
(2) Two-thirds heat, with fans at reduced speed and one of the supply phases to each heater switched off.
(3) One-third heat, with one heater only in each pit running at reduced load.
(4) All off.

A neon indicator lamp is located adjacent to the rotary switch and, in addition, a "rear heaters off" switch isolates the four units at the west end of the nave altogether to cover occasions when seating for the congregation extends over the two pits in this area. Circuits are arranged to give an approximate phase balance under all conditions.

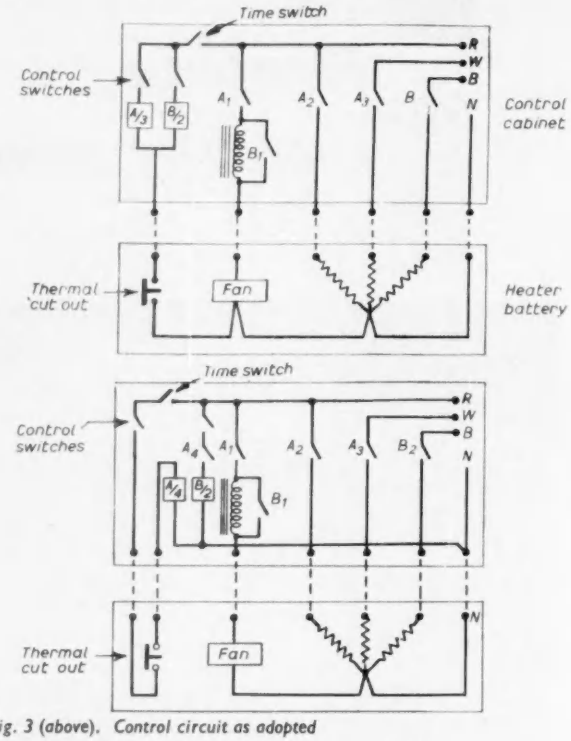


Fig. 3 (above). Control circuit as adopted
Fig. 4 (below). Preferred circuit in other circumstances

Heating Pits and Units

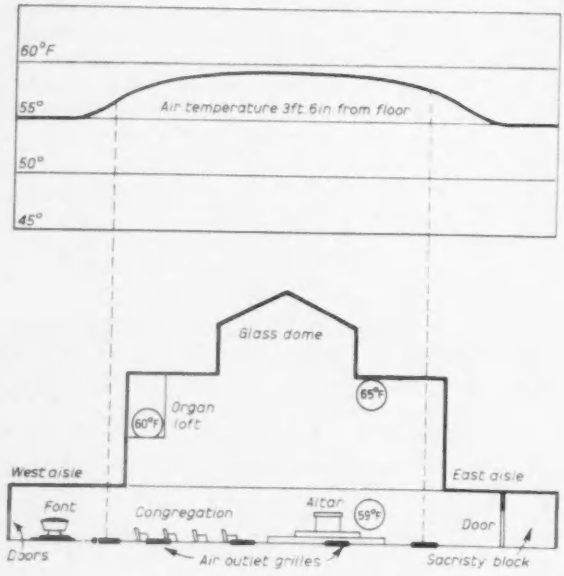
Details of the heater pits are shown in Figs. 5 and 6. The heater batteries are suspended from angle irons bolted to the main framing which supports the grilles and precast concrete slabs. The heaters themselves have resilient mounting brackets and the precast slabs rest on hard rubber pads at each corner. In result, this arrangement appears to have been very successful and no vibration has been experienced.

A photograph of the completed assembly with the outlet grille removed is also shown.

The heating units are of GEC metal enclosed pattern and manufacture with the 10 kW three-phase heating elements connected in star and with a 15 in. dia fan driven by a single-phase 700 r.p.m. motor.

Performance

The performance has been above expectation in regard to noise level. When all fans are running at full speed the noise is audible and is too loud for use during a service but is in no way objectionable. With fans at reduced speed the noise is inaudible to all intents and



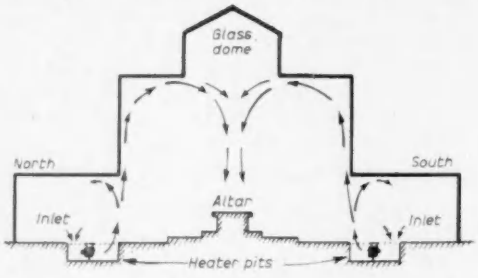
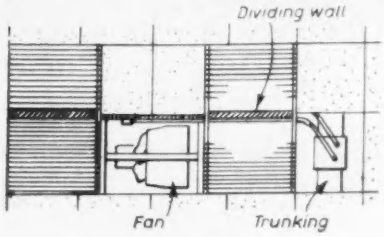


Fig. 2. Sections through the church building with indications of static temperatures and airflow



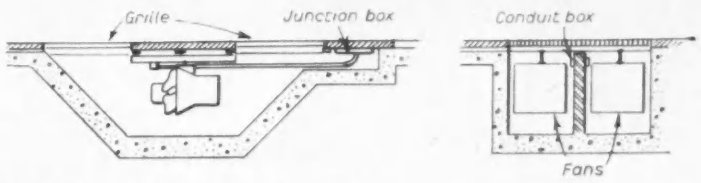


Fig. 5 (left). General plan of heating pits

Fig 6 (right). End and side elevation sections of heating pits

purposes, although it has been reported that it becomes audible late at night in the empty building. There is little doubt that, with a congregation in the building and an organ blower running, the fans will be inaudible against the background noise.

As regards heating effect, the results of a full-scale test are shown in Figs. 2 and 7. Fig. 7 shows the air temperature gradient on a vertical line in the body of the nave after 10 minutes' and 75 minutes' heating at full power and 30 minutes after switching down to reduced power. Fig. 2 shows the temperature at the breathing line taken across the nave after 90 minutes' pre-heating. These temperatures fell slightly on switching down to two-thirds heat but the test was made at night, against a falling air temperature externally with heavy rain. The installation was designed to achieve a temperature of 60° after three hours' pre-heating and it is likely that, after such a period, the fabric would have absorbed sufficient heat to maintain 60° on switching down to reduced power.

Fig. 2 also shows the air movement, as discovered by injecting smoke into the inlet grilles of the heater pits. With the fans running at full speed, the warmed air retains sufficient momentum to fall downwards in the centre of the building and so warm the congregation. In fact, a feeling of warmth is experienced as little as six or seven minutes after first switching on. The effect is not, of course, so marked with the fans running at reduced power.

Tariffs

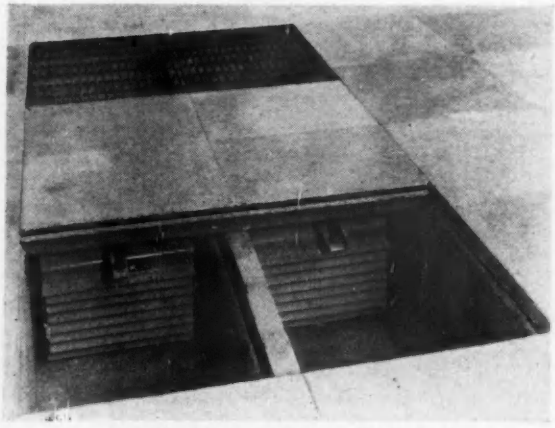
The installation is metered on a restricted hour tariff offered by the London Electricity Board at 1¼d per unit with no standing charge. The supply is available overnight from 7 p.m. to 7 a.m. and from noon Saturday until 7 a.m. Monday, as well as on Christmas Day and Good Friday. At other times it is not expected that full services will be held in the church and, for smaller gatherings, overhead radiant heaters which are separately metered on an unrestricted tariff have been installed in the chapels.

On this basis it is expected that the annual cost of electricity for heating the nave will be approximately £65. The additional cost for heating the chapels is hard to estimate but will probably be between £10 and £15 per annum. The LEB agreed to the omission of a main contactor to control the restricted hours installation and instead have inserted their time-switch in the supply to the relay coils as shown in Fig. 3. They have sealed the control cabinet and themselves undertake all maintenance.

Capital Cost

The capital cost of the complete heating installation, including controls, pits, grilles and heating units, is about £13 per kW which compares quite favourably with tubular heaters or any other form of electric heating, with the possible exception of overhead radiant heaters which might have been considered unduly obtrusive in a building of this type.

The architect for the building was Robert Maguire, A.R.I.B.A.; the general contractors, Bovis Ltd. and the electrical contractors, Messrs Dudley Bower and Co. The heating units were supplied by the General Electric Co. and the heating installation was designed by the electrical consultants, Peter Jay and Partners Ltd., in association with them.



View of heater pit with outlet grilles removed

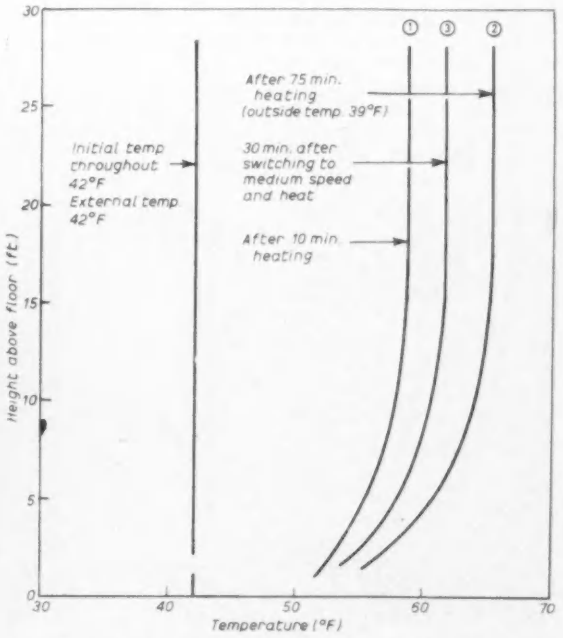


Fig. 7. Heating graphs in body of nave after different periods of heating

Fluorescent lighting in schools

BLACKPOOL'S EXPERIENCE JUSTIFIES CAPITAL COST

LARGELY as a result of its comparatively high capital cost, fluorescent lighting in schools is still something of a rarity in this country. The general tendency is to install tungsten filament lighting, accepting its higher running cost for a given level of illumination. The preference for tungsten in schools is also weighted, despite the widespread adoption of fluorescent in comparable situations, by some familiar, if misinformed, beliefs about fluorescent lighting: that its colour is "harsh" or "cold"; that it is "glaring"; that it "flickers"; and that it would produce "eyestrain" in children.

Such views, however, were firmly rejected by the County Borough of Blackpool when they embarked three years ago on a schools relighting programme. They are using fluorescent fittings almost exclusively, on the grounds that, for equivalent illumination, the lower running costs, combined with savings in installation costs, would offset the higher capital cost in three or four years. The success of their scheme merits its further attention by education authorities throughout the country.

Modernisation Problem

The problem facing Blackpool is one common to many local authorities—that of modernising schools whose electrical and lighting installations may date from before the first world war. Most of these schools have an existing installation of v.i.r. cables in surface conduit, supplying usually four pendant fittings in classrooms. In general, levels of illumination vary from 20% to 50% of that required by present-day standards. In fact, a survey of 36 schools in Blackpool showed average illumination levels in classrooms to range from 2·22 lm/sq ft to 10·81 lm/sq ft, of which 31 schools had average levels below 6 lm/sq ft.

If the lighting had to be brought up to standard by means of tungsten fittings, the council would be required to face expenditure for the complete rewiring of installations back to the main intake, not only to cater for the greater number of lighting points and larger rating lamps, but also to avoid the serious risk of fire, since the existing cables would have been totally inadequate to carry an increase in load, of up to five times in some cases, without severe overloading. The extended use of tungsten lighting would also increase running costs, virtually in proportion to the increased load, and this the council wanted particularly to avoid, since it was partly concern at the high running cost of existing installations which led the council to consider relighting. It was also felt that the increase in glare from brighter and more numerous light sources would result in visual discomfort and fatigue being experienced by pupils.

Major Advances

For these reasons fluorescent lighting was adopted for most of the schools being relighted, since it was found that its use would enable the required levels of illumination to be achieved without major rewiring. The useful life of 5,000 hr for fluorescent lamps meant that lamp replacement costs would be lower, whilst in some schools it has been found that their higher lumen efficiency has resulted in lower energy costs than obtained before relighting, despite the increase in illumination.

There were also the visual advantages of low glare, elimination of hard shadows and better colour rendering, with, of course, ability to adjust colour rendering where required for special-purpose classrooms. It has been found that in only three or four cases has it been necessary partly to renew wiring, conduit or distribution equipment.

The council put in hand immediately the relighting of four schools at a total cost, in round figures, of £17,500; they also made provision in their 1959-60 budget to

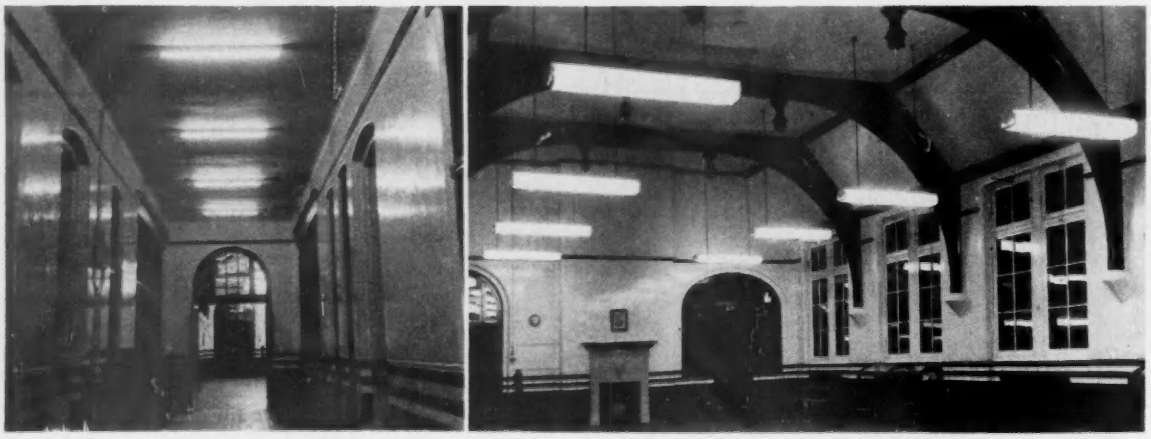


Fig. 1. Methods of employing fluorescent lighting in Blackpool's schools. Left, shows use of 4 ft batten fittings in lofty corridors; right, indicates the adoption of decorative fittings for assembly halls. Both views are of Devonshire Road primary school

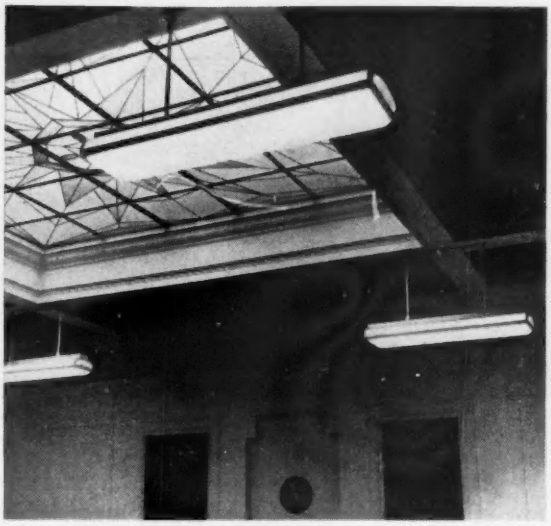


Fig. 2. Another use of decorative fittings to match decor, here shown in the main stairway of Blackpool Technical College

Fig. 3. Characteristic lighting for a general-purpose classroom, showing use of industrial fittings with angle reflector for chalkboard illumination

carry out a relighting programme for a further eight schools at an estimated cost of £16,200. In general, industrial pattern, stove-enamelled reflector fittings are used in classrooms, chosen to avoid incurring the additional cost of purchase tax.

To simplify stocking of spare parts, four (now increased to seven) main makers were originally chosen as standard by selecting "family" or unit ranges, from which a variety of fittings may be built up, using a basic spine and a comparatively small number of ancillary parts. As a general rule, one type of lampholder has been specified for a given school to minimise the stockholding of replacement lamps.

The fittings were selected after demonstration to the council's education committee, particular attention being paid to quality of finish, compliance with relevant British Standards indicated by use of the BSI Certification Mark, speed of assembly and ease of lamp changing, removal of reflector and, where applicable, removal of starter. Components of the fitting were to be completely enclosed to avoid unauthorised interference. Tapped chokes were a further requirement to cater for future supply change-over to standard voltage. To minimise cost, switch-start control gear was originally specified, but in later installations switchless-start equipment has been employed to simplify maintenance and prevent interference with the fittings by students and unskilled caretakers.

For general-purpose classrooms, 3,500°K colour lamps have been chosen as standard, with colour matching lamps for art, needlework and similar rooms. In mechanical, electrical and other classrooms where rotating machinery is used, lag-lead circuits have been employed to prevent stroboscopic effects.

Also in general-purpose classrooms the lighting installations have been designed to achieve a level of illumination of 15 lm/sq ft at desk-top height, for which end a mounting height above desks of 7 to 7½ ft has been found generally satisfactory. In an "average" classroom of 24 ft width and 24 ft length this usually results in the installation of four 5 ft single-lamp fittings, arranged in two rows down the length of the room, with their longitudinal axes normal to the windows. A further fitting with angled reflector is sited at the front of the room for combined chalkboard and desk illumination.

Arranged in this way, the installation may thus be switched in rows parallel to the windows without undue alteration to the existing wiring. It also involved only minor additions to the existing ceiling conduit to provide suspension points for the fittings. Conduit suspensions have been generally used except where sloping ceilings or laylights, encountered in some classrooms, required the use of chain suspension.

Fig. 4. Gymnasia present special problems, solved by the use of food-factory type enclosed fittings, as in this view at Tyldesley school

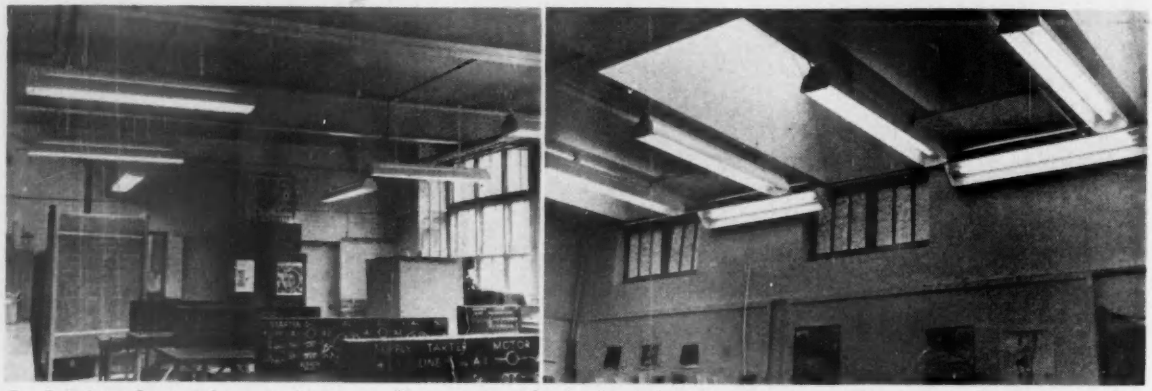


Fig. 5. Lighting for special purpose classrooms. The arrangement for the electrical machines laboratory at the technical college contrast with the higher lighting level and directional requirements of the art room

For art rooms, more elaborate arrangements were required to provide the directional element essential in the modelling of subjects. As shown in Fig. 5, the general lighting installation is supplemented by the addition of cornice units fitted in the angle between wall and ceiling, with the assistance of adjustable tungsten spot or flood-lighting fittings where required.

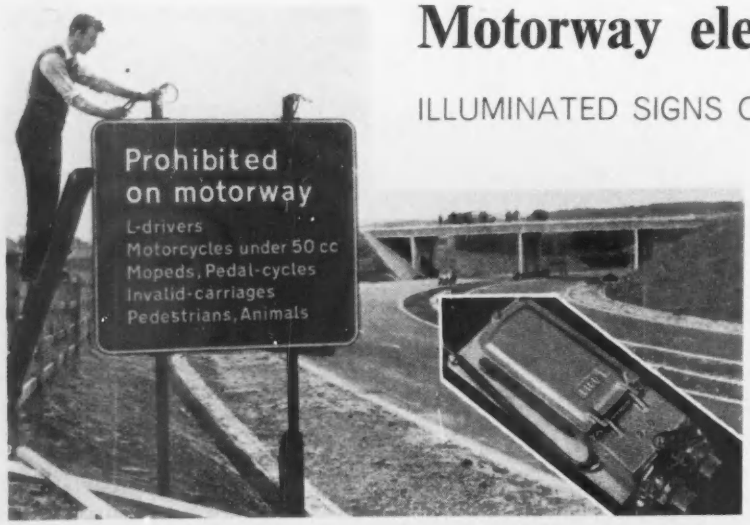
Gymnasia Lighting

Another special requirement is demanded by gymnasia, where provision has to be made to protect the fitting and the lamp from damage in case of being inadvertently struck by flying balls. The problem has been ingeniously and successfully overcome by employing enclosed fittings with metal reflectors and enclosing visors of clear "Perspex," of the type used in food factories. As shown in Fig. 4, the fittings are mounted close to the ceiling to minimise the chances of impact; at that height, moreover, the momentum at impact in nearly all cases would be insufficient to damage the plastics material. Gymnasia installations are designed to produce at least 10 lm/sq ft at floor level.

In entrance foyers, assembly halls and main stairways, decorative diffuser fittings are generally used to accord with the higher decorative standards of these areas. In some schools, to meet architectural and décor requirements, multiple tungsten fittings are used. In remaining corridors and passages, 4 ft batten fittings, directly mounted to the ceiling, are generally adopted to achieve a lighting level of 7 lm/sq ft.

Motorway electrics

ILLUMINATED SIGNS ON MAIDSTONE BY-PASS



Completing the internal wiring, with p.v.c.-insulated cable, of one of the signs on the Kent Motorway. Over 100 illuminated signs are spaced along the seven-and-a-quarter-mile length of the motorway which by-passes Maidstone. Power is brought to the signs by three- and four-core 0.0225 in. paper mains cable. Over 10,000 yd of this cable have been manufactured for the contract by BICC. Terminations of the power cables are made at the signs through a new form of fuse box, designed by BICC in accordance with the recommendations of the Council of Industrial Design for street lighting columns (inset). Circuits may be rated up to 30 A for fused line and neutral only, or fused in to outgoing phases. The box is also visible on the right leg of the sign

ALTHOUGH only 7¼ miles long, the new Kent motorway by-passing Maidstone, has more than 100 illuminated signs. Many of the larger signs are also electrically heated to prevent their being obscured by ice or snow.

Through the electrical contractors, S. J. Wright Ltd., BICC have supplied 10,000 yd of three- and four-core 0·0225 in. paper mains cable to bring power to the signs. The internal connections are of p.v.c. cable.

A new compact and weatherproof fuse box has been used for the terminations, designed by BICC in accordance with recommendations of the Council of Industrial Design for street lighting columns. The box is of cast iron and has four grommet-sealed outlets for 0·25 in. overall dia. single-core cable. Each grommet has a membrane which, when pierced, fits closely over the cable insulation. The boxes are suitable for single- and three-phase 440 V circuits.

CIGRE 1960

Towers and Foundations
Auto-transformer Design

Auto-transformer construction and design for high voltage systems and the adequacy of testing procedure occupied the greater part of the discussion at the CIGRE session on transformers. This week's report on the conference also makes reference to the discussion on transmission line towers.

Towers and Tower Foundations

MUCH of this year's discussions at CIGRE in the special group dealing with towers and tower foundations was concerned with progress in prefabrication of baseplates and foundations.

In Finland, where, at one time, the climate limited work on foundations to the summer months using conventional methods, considerable advantages were claimed for prefabrication.

The quantity of aggregate required for foundations could be more effectively controlled with prefabrication, and also a decrease in the size of footing was possible which, with other factors, led to more economical line construction. The method has been used for guyed, portal towers for system voltages up to 400 kV, but some speakers expressed the view that it was doubtful if the advantages claimed would be of value in this country, where weather conditions are less onerous.

Prefabrication

Progress in the use of prefabricated concrete piles for tower foundations was described by MR ZMUDZINKSKI (Poland). Test results have been satisfactory and the method was claimed to have the advantage of avoiding concreting work along the run of a line. The piles were driven in clayey soil and erection proceeded on average at the rate of two towers per day.

This method eliminated excavation work and was said to reduce both concrete and reinforcing steel requirements for the foundations.

Objections to the prefabricated foundations and baseplates given by MR AVRIL (France) were the difficulties of transportation to site and also the possibility of damage to the local terrain. It also seemed that they failed to take advantage of the natural adhesion of local soil unless comparatively expensive methods of compacting and possibly the extensive replacement of backfill was carried out. Advantages seem to arise from considerations of local conditions and no general conclusion was possible.

Use of piles had, however, several advantages, notably the ability to penetrate to deep foundation beds and to make the best of the adhesion qualities of local soil. An anomalous result of the investigations on piles was that resistance to uprooting force was more noticeable with small cross-section than with large cross-section piles.

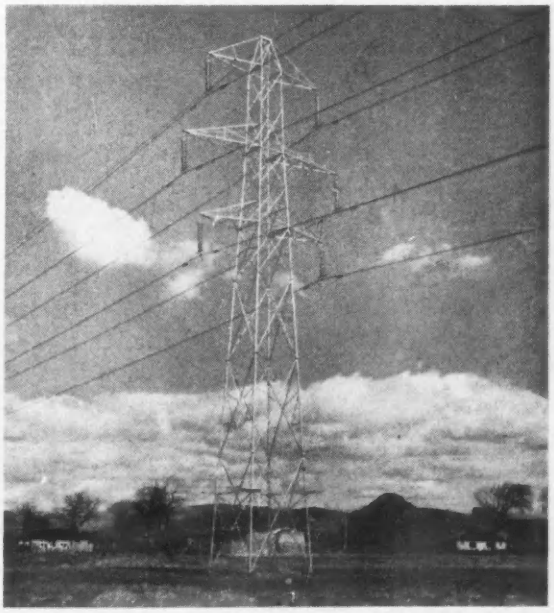
In a survey of Belgian experience on transmission tower foundations, MR VANDEPIERRE referred to the use of models for predicting foundation performance, but the general feeling was that such model tests would need to be corroborated by full-scale tests.

Description of a tubular tower construction which has recently been introduced in Scotland and which was claimed to give an efficient and graceful design was given by MR HARVEY (GB). The tower had several features of interest including a welded, galvanised unit construction which had given satisfactory results, but it seemed doubtful if the tubular construction could be justified on an economic basis.

Tower Testing

In describing work at the Lecco tower-testing station, MR BIANCHI DI CASTELBIANCO (Italy) referred to construction trends apparent in the world today. They include the use of thin flange angles, addition of tension bracings to towers and the use of high elastic limit steels, particularly for bolts. However, there was some support for the view that savings which might be anticipated with these constructional features would be counterbalanced by greater fragility, particularly under dynamic stresses.

By a reassessment of safety requirements and more thorough study of tower design, both with full-scale and model tests, French engineers have been able to reduce tower weight and to save money on erection. These results were given by MR CAILLEZ (France) who, in his report,



Standard support tower for 132 kV Scottish transmission line at Bainsford. A tubular, unit construction has been used. The height of the tower is 86 ft 6 in. and it weighs 2·77 tons

referred to total weight of material reductions for similar lines over a six-year period of over 50%, with appreciable savings in erection time on other lines.

Transformers

ASPECTS of large auto-transformer design have become of increasing importance recently with the development of e.h.v. interconnected systems, and it was discussion of some problems associated with these units that occupied a large part of the one-and-a-half-day CIGRE sessions devoted to transformers.

The main items of interest were tertiary winding arrangement and whether it was possible to omit this winding when no external auxiliary supply was required. Then the meeting discussed existing methods of direct and indirect regulation and whether they solved all present-day problems. Some difference of opinion was apparent during both this subject and the subsequent discussion on protection and testing of auto-transformers against impulse waves.

Difference of opinion became more pronounced when aspects of transformer testing in general was raised, with particular reference to the use of sphere-gaps and the relative merits of chopped wave and front-of-wave tests.

Considerable progress has been made in methods of oil preservation and sealed expansion systems. These were described and the session concluded with references to short-circuit stress evaluation and bonded cores developed in Switzerland.

Tertiary Windings

The obvious economic advantages of omitting the tertiary winding were supported by the possibility that it may increase fault current in the common winding in the event of medium voltage to earth fault. On the other hand, the tertiary was considered essential by some speakers to limit telephone interference and as a means of ensuring low zero-sequence reactance of a system to meet the condition for effective earthing. The tertiary winding also often provided a convenient excitation winding during testing.

The study committee report emphasised that a tertiary winding rating should be sufficient to enable it to withstand short-circuit conditions, taking into account the three sequence-impedances of the connected systems and not the over-simplification sometimes used of considering the transformer as being connected to infinite busbars. The tertiary winding rating should be left to the designer and not specified by the customer, or given as the arbitrary figure of 1/3 of the through power, which only formed a convenient starting point for calculation.

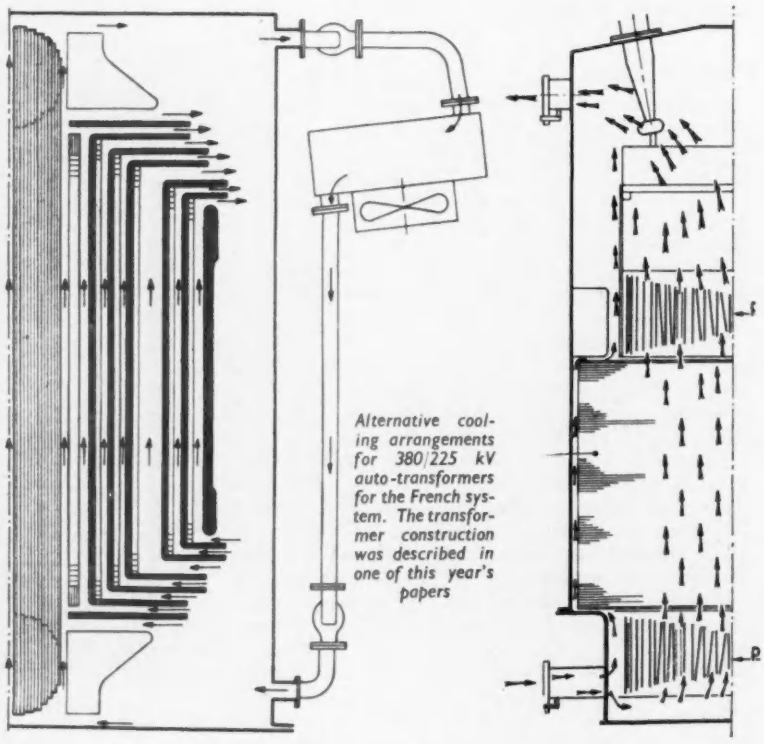
The meeting did not resolve the problem of whether a tertiary or stabilising winding was essential on a large auto-transformer. A number of parameters were involved and although high rating auto-transformers without tertiary windings were in service and one 300 kV system employed auto-transformers with a stabilising winding which could be opened, insufficient information was available to enable a satisfactory conclusion to be drawn.

MR LAURENT (France) said that the French system had several transformers operating without the delta winding and it was not really needed. Its omission gave a slightly less expensive unit, with smaller size and possibly reduced stress on the m.v. winding section, but he thought that each case needed to be considered on its merits and no general conclusion was possible.

In summing up the discussion, MR RIPPON (GB) said no rules could be laid down. The delta winding rating could not be universally specified and information from Sweden indicated that operation with an open delta winding gave excessive telephone interference. He concluded by saying that anyone courageous enough to do without a tertiary winding should write a separate paper about it!

Impulse Protection

Various arrangements have been used to protect auto-transformer windings from the effect of surges approaching on either of the connected systems. A particular danger with close ratio auto-transformers was that a surge on the high voltage side may be applied to the relatively small number of turns in the series winding, since the medium voltage winding would be held virtually at earth potential by the system. Among the various methods used for protection against such surges are arresters on the h.v. and l.v. terminals of the transformer to earth or, alternatively, spark gaps between terminals and earth. Another arrangement was to use an arrester to earth on the h.v. side and spark gaps to earth on the m.v. side. One of this year's reports claimed advantages for a further arrangement, using an arrester between m.v. and earth with a shunt arrester connected across the series winding.



Alternative cooling arrangements for 380/225 kV auto-transformers for the French system. The transformer construction was described in one of this year's papers

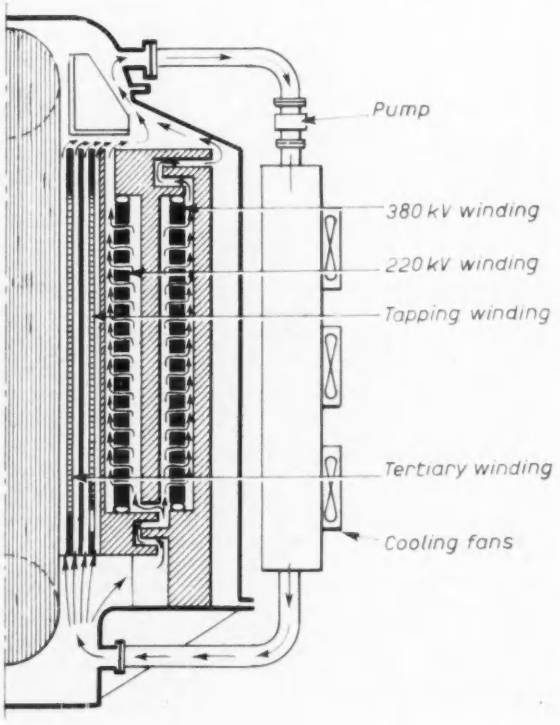
Commenting upon this arrangement, MR CHRISTOFFEL (Switzerland) thought it would not be possible to carry out tests with the arresters connected and asked how this difficulty could be overcome. He added that, in his opinion, arresters between the h.v. terminals and earth were essential.

On the other hand, MR AUTH (Germany) supported the report and referred to a boosting transformer successfully protected by an arrester between the h.v. terminal and earth with another in parallel with the series winding. Reduction in insulation level may be possible with the arrangement as pointed out in the special report. MR MEADOR (USA) said that arrester protection could often be omitted if a study was made on a given system, but frequently the future requirements were not known and it was then necessary to use the maximum protective arrangement. In France, according to MR LAURENT, the modern policy is to equip auto-transformers with gaps on all terminals, including those of the tertiary winding.

In conclusion, MR RIPPON (GB) said that there seemed to be little support for arresters across the series winding as they were likely to be susceptible to over-voltage difficulties.

The idea of surge diverters on the h.v. to earth and rod gaps on the l.v. to earth still needed investigation, although it had been used on the French 400 kV system. On occasions it may be permissible to omit the h.v. surge arrester if a non-linear resistor, or arrester, was connected across the series winding, but it would generally be limited to lower voltage series windings such as those on voltage-regulating units.

Satisfactory experience had been obtained by using non-linear resistors without spark-gaps as a means of voltage control on tapping and other windings. In general, oil-immersed, sealed resistors with spark-gaps have now been superseded by non-linear resistors.



Sphere-gaps

The sphere-gap as a method for measuring power frequency test voltages came in for sharp criticism in a report by MR MEADOR (USA), who described several preferred methods of measurement including excellent results obtained with a crest voltmeter connected to bushing capacitance taps, a method which has been used in the USA for some years. MR POPOV (Germany) said that the sphere-gap was being used less and less. He referred to the use of compressed gas capacitors for routine testing up to 600 kV and which gave an accuracy of 1%. He thought that ionization tests were of great importance, especially with reference to the new dry-type transformers, and referred to an instrument for carrying out these measurements.

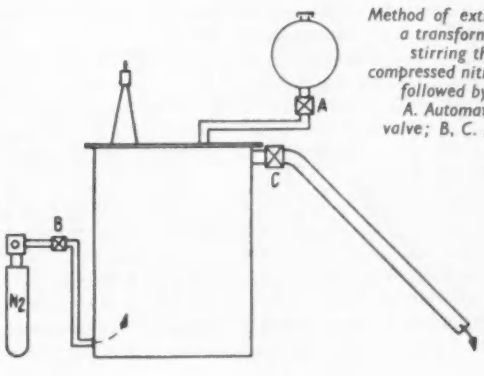
MR EDWARDS (GB) did not agree with the criticism of the sphere-gap, in fact he said that with latest information it had been rejuvenated. Although use of a crest voltmeter with a tapped capacitor bushing may be basically more accurate, the sphere-gap had certain advantages, for example, and most obviously, ease of checking its setting.

Summing up, MR HARPER (GB) said that two speakers strongly favoured the sphere-gap, which was generally used in Europe, while other members were in favour of other devices. In general, the sphere-gap seemed to possess certain advantages.

Surge Tests

The chairman, MR NORRIS (GB), in opening the discussion on the relative merits of chopped wave and front-of-wave tests, commented that most of Europe did not use the chopped wave test but that it was used in the USA, Britain and in the USSR. The need for a chopped wave test was based on practical experiences of flash-overs in substations. The problem was to resolve the two points of view. These tests were introduced when earthing wires were not in general use for overhead lines and spark-gap protection was used for substations. The European view was that the front-of-wave test, which only stresses bushings and their immediate vicinity, was of no value and that chopped wave tests have only slight interest. However, although the original reason for introducing these tests no longer existed, they have been found useful for quality control during manufacture and in proving the withstand and protective volt-time characteristics of arresters in the first few microseconds of wave application.

The front-of-wave test was felt to be of increasing importance by MR PALVA (Finland) because of the wider use of rod gaps. On the other hand, MR PAUME (France)



Method of extinguishing a transformer fire by stirring the oil with compressed nitrogen gas, followed by ejection: A. Automatic sealing valve; B, C. Automatic gates

attached little importance to them and thought they increased the cost of the transformer considerably. MR AUTH (Germany) saw no use for the chopped wave test above 220 kV and could recall no known failure of transformers due to steep waves. This was supported by MR HOLMGREN (Sweden). MR GEE (GB) received general support when he said that there was danger that in specifying front-of-wave tests the transformer would be designed for the test rather than for actual service conditions. It would have insulation to withstand the test because it would be designed for a subsequent high bil test. It would be too good for the job and would cost more. He thought there was a danger that we were getting too clever with our testing.

MR SOLLERGREN (Sweden) saw no need for a chopped wave test, provided arresters were properly designed. But MR HARPER (GB) thought the chopped wave test good for quality control, while the front-of-wave test was not very necessary and he could not understand American enthusiasm for it as a means of quality control.

The meeting also discussed the introduction of switching surge tests, but it was generally felt that present standard tests gave an adequate level of insulation. However, the investigation of dangerous corona discharge levels and possible inclusion of tests in standard procedure was supported by several members.

Oil Preservation

Considerable discussion was promoted by a survey report on preservation systems used for transformer oil and associated problems. The report described various types of conservator arrangements with either air or nitrogen breathing and outlined recent designs using sealed systems with neoprene or butyl expansion seals. A survey of methods of fire extinction was also made.

MR TOURNIER (France) thought the classic conservator arrangement satisfactory provided a suitable dehumidifier was fitted. MR ENAULT (France) said that nitrogen breathing transformers had been in operation in France for four years without maintenance and that this type of seal had been applied to nearly 1,000 transformers. MR JOSSE (France) described in some detail experiments with synthetic rubber breathers on transformers up to large ratings. He said humidity had extremely harmful effects and claimed no great difficulty in making joints impervious to gas leakage. To support this statement he quoted a figure for a dry nitrogen-filled tank of 0·4 gm of water, per joint metre, per year. However, he also quoted a reduction in failure rate due to humidity over seven years from 7·75% of installed capacity to 0·85%, which is considerably higher than the fault rate to be expected in Great Britain.

Several speakers, including MR HARDERN (GB), spoke of the value of oil power factor measurement as a test additional to the usual dielectric test, and MR GOLDSTEIN (Switzerland) said similar tests had been conducted in his company for many years. MR LUTZ (Switzerland) referred to a sealed unit which had been in service for nine years, still with oil in a condition complying with ageing tests for new oil.

Whether it was justifiable, economically, to aim at the criterion of keeping oil system separate from humidity and oxygen and thus claim the possible increase of up to 20°C in hot-spot temperature suggested by some authorities, or whether a simpler oil-preservation system but still giving satisfactory long operation time without maintenance is to be preferred, was not resolved in the discussion.

The discussion was later extended to deal with the life duration of oil-immersed paper and the criterion expressed in one report that ageing of transformers is characterised by the mechanical strength of conductor covering paper.

Mechanical Stresses

Probably for the first time an analysis has been made of short-circuit radial stresses on transformers. The analysis was made with models and the authors concluded that the deformations produced by dynamic stresses experienced during short-circuit conditions were considerably smaller than those resulting from static stresses of the same magnitude.

They also found that the inner winding performed better than the outer winding under equal magnetic forces and that there was a rapid increase in permanent deformation as soon as the value of 0·2% was exceeded. Finally, resistance to short-circuit deformation depended largely on the support given to the layers nearest the leakage path by more distant layers.

The first point was questioned by MR WATERS (GB) on the basis of recent tests carried out at ERA which suggested that the difference between static and dynamic stress found by the authors probably resulted from the considerable spread in the characteristics of copper due to work hardening—an effect which has been found to be very important.

MR TORSEKE (Sweden) did not think it possible to use models to test for inner winding stress reduction and tests on the outer winding model would be difficult to interpret. Although in agreement with the author's findings, MR MONTGOMERY (GB) thought that they should be used with great caution as the basis for design calculations, and said, in his opinion, more importance should have been given to progressive deformation resulting from repeated short-circuit stressing.

The author, MR CHRISTOFFEL (Switzerland), maintained that even if the spread of copper stress strain curves was taken into account there was still a difference between the static and dynamic loading tests.

Bonded Cores

Describing a technique developed in Switzerland for bonding cores, MR BRECHNA said that the method had enabled the core loss of a 5 MVA transformer to be reduced by up to 22% at 15 *k* gauss. The technique had the further important advantage that the scatter of core loss measurements on a large number of transformers of the same type lay within very tight limits. The method, he claimed, was easy to apply and had been used with cold-rolled steels for both transformers and rotating machines.

Tests on bonded stacks suggested that noise level was also reduced considerably, especially at low flux densities. For example, at 14 *k* gauss, comparative tests on 800 kVA interleaved and bonded core units showed 91% and 86% noise level, respectively, of NEMA standard.

Space factors quoted for the bonded cores depend on the viscosity of the bonding material, but the maximum reduction on the space factor for phosphatised sheet was claimed to be only 1% to 1½%. Although development of suitable bonding materials was not yet complete, the report suggested that epoxy resins have proved most capable of meeting the two prime requirements of low viscosity and long pot life.

Surprisingly, this paper provoked little discussion, in spite of what would seem to be most promising results.

The Royal Show 1960

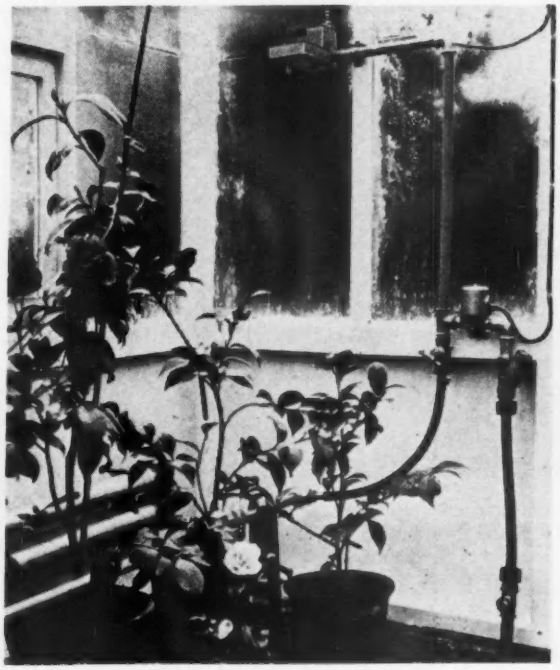
"ELECTRICITY FARM" A POPULAR FEATURE

ONCE again the "Royal Show" has come and gone, leaving behind an unforgettable impression of the country's thriving and progressive agricultural industry. This was the 112th show since the first was held in 1839 at Oxford and it is the fifth occasion on which it has been held at Cambridge—it now leads Oxford 5-4—but it has already been decided that next year the show will again be held on the same site, only the second occasion in the long history in which one town has been the hosts in two successive years. The record of three successive years still, however, stands to Park Royal, 1903-1905.

As always, the main interest is naturally in the fine display of livestock—there is, fortunately, little chance of mechanisation ousting animals as entirely on the farm as it has on the roads—but the excellent and comprehensive display of machinery, tractors and mechanised farm equipment and the attention which it attracted from farmers and farm-workers alike belies the fable that British farmers are conservative in their methods; on the contrary, they are as progressive and as alert to take advantage of new ideas as those from any country in the world.

"Electricity Farm"

The part that electricity plays in modern farming was excellently portrayed in the EDA exhibit, "Electricity Farm," on which members of the Eastern Electricity Board were kept busy answering the streams of questions from visitors of both sexes on the merits of the latest domestic electrical appliances to the technicalities of incubation, grass drying and general horticulture.



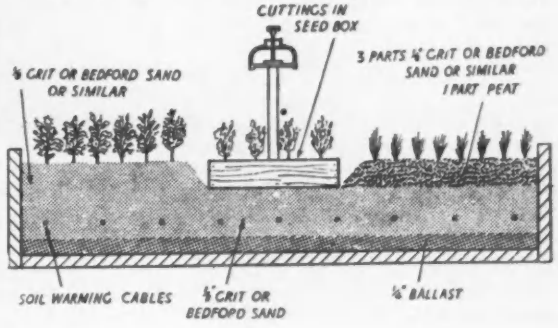
It is not necessary for new appliances to be constantly coming forward to maintain interest in electricity on the farm and, indeed, new appliances or ideas were singularly scarce in all sections of the show. The sole electrical contribution, so far as we could discover, was the new "Koltec" dual purpose fox-scarer and line-fencer on the Curtis Padwick stand. This has been developed for game preservers, turkey and sheep farmers and others who are liable to depredations in their livestock flocks from raiding foxes. It is, in effect, a standard fence controller which can be switched over to pulse a bright neon bulb in a "Perspex" dome during the night time, when the fence would normally be of little use for restricting stock movement. The bright flash, occulting 50 times per minute, can be seen up to two miles and is said to alarm even the most desperately hungry fox.

One of the most frequented points in "Electricity Farm" was the greenhouse where heating by electricity and "mist-propagation" were being demonstrated. The latter is not entirely new, having been previously shown and described in EDA handbook 1734, "Electricity in your Garden," but this year the number of inquiries from the amateur gardener would seem to indicate that, wherever there is a greenhouse, there is a potential sale for this equipment costing well under £20. It is, of course, equally applicable to the smallholder's requirements and, naturally, where there is "mist-propagation" there is also a need for electric soil-warming or greenhouse-heating. One of the visitors to the greenhouse was H.R.H. the Duke of Gloucester.

Electrical Appliances

Exhibitors from the mainly electrical industry included AEI, who were demonstrating the "Pyroflector" infra-red dull emitter heaters for pig and poultry rearing, heating units for sterilisers and steam raising, electric motors and control equipment; Black and Decker, with their portable

Mist propagation in the amateur greenhouse attracted more than usual interest this year. The diagram shows a mist unit in a seedling box


CUTTINGS IN SEED BOX
3 PARTS ¼" GRIT OR BEDFORD SAND OR SIMILAR 1 PART PEAT
¼ GRIT OR BEDFORD SAND OR SIMILAR
SOIL WARMING CABLES
¼" GRIT OR BEDFORD SAND
½" BALLAST

H.R.H. the Duke of Gloucester in the greenhouse of "Electricity Farm." With him is Mr J. I. Bernard, director and secretary of EDA

electric appliances for the home and the farm; Hoover, domestic appliances and fractional h.p. motors; Kenwood, kitchen appliances including the "Dishmaster" washing-up machine, rotisseries, mixing machines and the "Norge" refrigerator; and Joseph Lucas, who were exhibiting mainly electrical equipment for tractors and other mechanised farming appliances.

Other electrical exhibits were to be found on the stands of Adam and Benson, who were showing electric clippers; Aerovap, demonstrating thermostatically controlled insecticidal vaporisers; Ardleigh Spraying Co., with electric welding equipment for use *in situ* on the farm; B.E.N. Patents, a display of compressors which included portable electric models; Barford (Agricultural) Ltd., an electric combined boiler/water heater for dairy sterilising, farm food cooking, etc.; and Curfew Appliances, who were also showing electric food steamers as well as electric brooders. On the Melotte stand, the "Electrobrain" fully automatic system of washing and sterilising milk pipelines and equipment was demonstrated as well as the "Melotronic" transistorised master pulsator for milking machines. Ransomes, Sims and Jefferies showed the only electric lawn-mower we could see, the "Electric Mercury Mk II," though several stands were showing petrol-powered lawn-mowers.

Supply Facilities

One of the impressions of the event was the rather more permanent aspect of many of the stands, a justifiable step since the show is to remain in place for next year. This represents a marked economy, too, for the organisers, the Royal Agricultural Society, who have to transport and set up their own electrical equipment and plant at each site, no easy task when one realises that the total weight of all transportable equipment exceeds 2,000 tons. As it is, the present 125-acre site on Trumpington Farm has been provided with essential services equal to those of a town of about 5,000 inhabitants, water alone being consumed at 15,000 gallons/hr during the show. Four substations and some 50 miles of cable provide power and light from the EEB mains, while an extensive underground telephone system is also installed. Even the seven-acre caravan site, housing a large proportion of the personnel who have been working on the preparation of the show since last August, is fully equipped with water, sanitation and electric light and power.

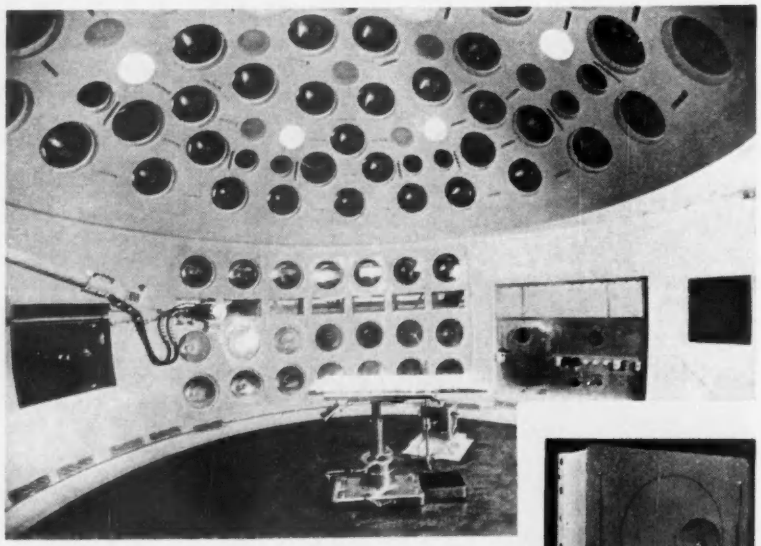
Lighting for Brain Surgery

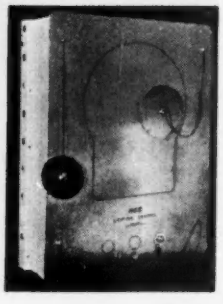
The highly skilled work of the brain surgeon calls for good, shadow free lighting, aseptic surroundings and dust-free atmosphere. Operating theatres must also be free from explosion hazards incident upon the use of electrical equipment in the presence of volatile anaesthetics.

All of these requirements are fully met in two new theatres at Western General Hospital, Edinburgh, designed for Professor N. McOmish Dott, the brain surgeon, by Mr. J. Holt, F.R.I.B.A., the architect, in collaboration with the electrical consultants, Donald Smith, Seymour and Rooley of Glasgow.

Lighting is from a pattern of 75 W silvered Osram 50 V lamps in anodised aluminium reflectors, focused on to the operating table, behind glass screens in the domed ceiling. There are 68 of these units and the pattern required is provided by a unique magnetic control system mounted on the wall, each lamp being individually controlled by a magnetic switch responding to ferrous metal plates of varying shape and size magnetically held to the front of the non-ferrous cover isolating the switches from the theatre. By cutting a disc to the required shape and placing it in the desired position on the outline engraved on the cover, the chosen pattern of lighting will be switched on. About 12 of the projectors are used at a time giving about 2,000 lumens/sq ft at the focal point.

Heat absorbing filters screen off infra-red radiations to provide a cool light. Lamps and control equipment were developed and made by the General Electric Co.





View of operating theatre with, below, close-up of the control unit

NOTES ON WIRING

BY MEGOHM

DURING the past weeks my friends in the contracting business have been complaining of protracted deliveries of accessories and, in particular, switches with metal plates. Are we suffering from a shortage of steel? I think that we are approaching such a shortage but nobody will "admit" it. So far, the conduit manufacturers seem to be happy and I sincerely hope they stay that way. There is still a vast demand for metal plates to switches despite the modern and contemporary lines of insulated plates available on the market today. One of the best finishes in metal plates which I have seen is that which goes under the name of "damaskeen steel." This is a bright finish with inlaid decoration and is extremely durable and highly suitable for hospital use. I know of one hospital where this type of plate has been used and has stood up to the attentions of these zealous polishers who are, it seems, an essential part of hospital staff.

Novel Instrument

I have received details of a novel instrument which has been developed by an electrical engineer and which he calls a "Cable Core Identifier." This instrument has already been described in the feature "Equipment For Industry," and I mention it again as I feel it may have escaped the notice of many contractors whose interests are outside industry. I have in mind one contractor whom I saw dashing around a site "ringing out" a multicore cable.

The instrument consists of two units of equipment housed in one case. One unit comprises a bank of resistors connected to 11 flexible leads terminating in numbered shrouds. The second contains a high resistance milliammeter, a dry cell, a limiting resistor and a compensating rheostat. Two test leads are connected to suitable outlets. The test is made by connecting the first unit to one end of the cable and the second unit at the other end. A chart, fitted in the lid of the case, gives the compensator settings for various lengths of commonly used cable. From the descriptive leaflet it appears that this is a relatively easy instrument to use and at a cost of £15 12s 6d is not prohibitive to even the small contractor. I can see that such an instrument would be invaluable on m.i.c.c. cable work and on many other installations where the normal practice of ringing out is a necessary task.

Accessories

Feeling is rising at the unrestricted importation of electrical accessories from the "Empire." I have been watching the growth of these in the big multiple stores and feel that they are not really up to the standard which we engineers like to see put on sale to the general public. Of course, many of us do not like to see certain accessories on sale to the general public anyhow, but as we must live with this evil then let us make this evil as good as we can. I remember visiting a testing laboratory some time ago and I was told that the accessories received from one well-known chain store were remarkably robust and electrically sound. I could hardly believe this for I had carried out my own "tests" on a lampholder from this store and found that when it was in use it almost glowed with heat! After a few weeks' use the holder fell apart when removing it from the flexible.

I have often sat and considered just how much thought goes into the designing of an ordinary lampholder, and then the amount of work involved in manufacturing it to sell to us at the cost of a shilling or two. Surely the accessories business is competitive enough without the introduction of articles made abroad where living standards are low.

School Training

Looking through the preliminary drawings for a new boys' school I was struck by the facilities made available to youths today, especially in the mechanical engineering line. The science laboratories, too, offer opportunity to experiment to great lengths and, no doubt, the subject of electricity is included in the syllabus. But is the really practical side of electricity ever discussed or taught inside these magnificent buildings? I feel there is a need to show schoolboys that a great opportunity is open to them in the electrical industry, and I don't mean only the side of the industry where slide rules and impressive calculations are the order of the day. Let these youngsters see the contracting side, the generation side and everything that goes with the industry. Some teachers have argued with me that such a class would be impossible in a school, but I feel sure that something useful could be evolved.

One teacher friend of mine *does* agree that something could be done and has proved it by arranging such a class. Progress has been slow but at least those pupils who felt that they would like to be electrical engineers have now something basic to think over. I should like to see more such classes being formed in schools even *as an experiment*.

Electro-medical Safety

I note with interest that a circular has been issued by the Ministry of Health calling for greater attention to electro-medical equipment in hospitals. This circular was reviewed in the ELECTRICAL TIMES of 30 June, 1960. This subject is, of course, a very delicate one, but the fact remains that such equipment when not maintained by a *competent electrician* becomes a lethal weapon. And there are certain hospitals where such apparatus is built on the premises and the work is seldom seen by the staff electricians. Good maintenance and testing is absolutely essential for such equipment and, of course, the correct testing equipment must be available. There is no excuse for our hospitals to be without a first-class set of testing equipment. Electricity plays a very big part in hospitals, apart from such equipment as mentioned above, and the internal electrical systems must be kept in first-class condition. All this, of course, raises the matter of available labour in hospitals, and I have found in the past that the engineering staff (mechanical and electrical) have more than enough to do. Any added duties such as testing medical equipment might only make matters worse.

OVERSEAS NEWS

from our correspondents abroad

CANADA

SPC's Acquisition

After long-drawn-out negotiations, the Government-owned Saskatchewan Power Corporation has acquired the undertaking of the National Light and Power Co. at Moose Jaw. Price of the acquisition is $7,562,500, of which about half is being paid in cash and the remainder in provincial bonds. The company's franchise to supply throughout the city of Moose Jaw is due to expire next May and the city itself had decided not to exercise its option to buy the system. There are nearly 8,000 consumers in the area.

Swiss Francs Loan

The Saskatchewan provincial treasurer, Mr. C. M. Fines, has announced the sale of a 40 million Swiss francs loan in Switzerland — equivalent to about $9,100,000 in Canadian currency. The proceeds will be advanced to the Saskatchewan Power Corporation which, in the past, has purchased generating equipment from Canada. This is the first Canadian provincial loan issued on the Swiss market. The bonds mature in 15 years, bear interest at 4½%, and are being offered to the public at par. They are payable in Swiss francs only. The issue has been underwritten by a syndicate headed by the Swiss Bank Corporation, Swiss Credit Bank and the Union Bank of Switzerland. If it proves successful, it could be the forerunner of a number of future issues.

Electronics Industry's Plea

Alarmed at rapidly increasing imports of Japanese goods, the Canadian electronics industry has drawn the Government's attention to the need for urgent action. The section hit most hard is tube manufacture and it has been stated that if Japanese tube imports are not controlled, Canadian manufacture of tubes will cease within 18 months. The Electronics Industries' Association of Canada maintain that the local taxes on tubes are unfair to domestic production. Whereas the average Canadian tube costs about $1, their manufacturers pay about 26c in sales and excise tax. The average Japanese tube costs 31c, to which is added a 20% duty (about 6c) and an 11% sales tax and 15% excise tax (some 9c or 10c together), so that with a lower price the tax is also below that of the local product. Most Japanese tubes are sold in Canada as replacements and the association maintains that in assessing the "fair market price" in Japan, the "equipment market" price has been used instead of the "replacement market" price.

U.S.A.

Geothermal Station

Claimed to be the first geothermal power station in North America, the new Geysers plant of the Pacific Gas and Electric Co., near Healdsburg, California, is now ready for operation. The plant has an installed capacity of 12,500 kW, but there is space for the addition of further plant if sufficient steam becomes available. Before embarking on the project, careful investigation was made of the likely steam source, from which it was estimated that supplies were sufficient to operate the plant long enough to justify it economically. The company estimates it can get steam for 2¼ mils/unit generated—much lower than by conventional fuels. The plant has been erected at a rather isolated spot in North Eastern Sonoma County.

BOLIVIA

Opportunities?

The possibilities of business opportunities in the little-known Beni department of Bolivia have been recently referred to by the British Consul in La Paz. This central area is almost undeveloped, but has considerable natural resources. At the moment there is no public electricity supply, but it is expected that arrangements will soon be made for the installation of a small plant at Trinidad, capital of the department. Farther north, at Riberalta, there have been plans for a public electricity supply, but no action has yet been taken, it seems.

SWITZERLAND

H.E. Scheme

Plans for a further Swiss hydro-electric project, to utilise the waters of the upper reaches of the Rhône between Gletsch and Brig, within the next ten years have been announced. There would be two stages of construction, the first involving a dam at Gletsch to hold some 100 million cu metres of water, together with a power station and link gallery to Münster. In the second stage a series of galleries would be built between Münster and Brig to supply water to a 300,000 h.p. power station. Finance for the Gletsch project would be provided by Swiss Aluminium Industry of Zürich and Chippis, Elektro-Watt A-G, and Motor-Columbus of Baden. Work on the Münster-Brig section would be undertaken by a company financed by the Societe Generale pour l'industrie of Geneva (who will be responsible for technical planning), the SA Neuthateloise d'etude de concessions Hydraulics, the Valais Canton Government, the Le Lonza Co. and the Grande Dixence SA.

SPAIN

New Stations

During a recent visit to the Balearic Islands, Gen. Franco inaugurated two thermal power stations at Mahon, Minorca, and at Palma de Mallorca. The first of these will supply all the domestic and industrial requirements of the island and is powered by two diesel generators of 1,000 kW capacity each; the second has two generating groups of 15,000 kW each and was built at a cost of 800 million pesetas.

CYPRUS

New Republic

The formation of a new central body of the Electricity Authority of Cyprus is imminent following the signing in Nicosia last week of the agreement concerning the future of the island under which control of all such public operations is transferred to the new Republic. As part of the arrangement, Gt. Britain has agreed to provide financial aid amounting to £12 million during the next five years. In addition, Britain has also promised, at the request of the Cyprus Government, to make a loan towards the extension of the island's electricity supply. An annex to the treaty provides that the Republic shall accord most favoured nation treatment to Britain, Greece and Turkey. Apart from allocating specific areas to Britain for the operation of military bases, special provision is made that the Dhekelia power station (the island's main power source), which stands on Republican territory, may be worked by British personnel if, for any reason, it fails to provide adequate supplies for British use. Aug. 16 next is Independence Day for Cyprus.

QATAR

£700,000 Order

The Electricity Department of the Qatar Government has placed an order with the General Electric Co. Ltd., of England, for two 15 MW single pass-out turbo-generators for installation in the Ras Abu Aboud power station. The order, which is valued at nearly £700,000, includes the condensing plant and boiler feed pumps, together with the cranes, compressed air system, and the air conditioning and ventilation plants for the station. The power station is to be located on the coast, about three miles east of Doha and some 24 miles north of Umm Said, and is to be linked with the electrical networks of these towns by underground cables and overhead lines, respectively. The new turbo-generators will be suitable for operating in parallel with five 2,600 kW 11 kV diesel generating sets already installed at Doha. The turbo-generators are rated at 11 kV 15 MW 50 c/s with t.s.v. steam conditions of 600 lb/in.^{2} gauge and 850°F. The pass-out steam is to be used for distillation of sea water to produce drinking water, some 110 klb/hr of steam at 12 lb/in.^{2} gauge being bled off. The turbines exhaust at 27½ in. vacuum. Delivery of the first set is scheduled for December, 1961, and that of the second set for March, 1962. Consulting engineers for the project are Preece Cardew and Rider.

UGANDA

More Limiters

Use of the limiter system in providing power supplies to African households is being adopted by the Uganda Electricity Board in a campaign for increased household electrification. Two ratings of consumer's unit, made up locally, are available. The smaller, of 1 A capacity, consists of a 15 in. by 8 in. board mounted with a main switch, power point and lamp bracket, together with shade and bulb. This device costs 60s, including fixing and there is a fixed monthly charge of 8s 6d for the limited supply of electricity. The other unit is of 5 A capacity and the fixed monthly rate is 20s. Normal service charges for the connection, by the board, of the line to the consumer's premises are payable by purchasers of the consumer's unit. These charges may be as low as 60s. A number of the devices have already been installed in the Kampala area and orders have been received for a complete housing scheme at Soroti.

S. AFRICA

Athlone Progress

Disturbances in South Africa earlier this year slowed down construction work on the new Athlone power station, at Cape Town, for about a fortnight, but the contractors hope soon to be back on schedule The first two 30 MW turbo-alternators and four boilers are being installed and these are expected to be ready for testing towards the end of the year, and it is anticipated that the first two sets and three boilers will be in commission next winter. A third generator is expected from Switzerland soon. These machines are being supplied by Oerlikon and the boilers by John Brown Land Boilers (Africa) Ltd. It may be recalled that when the tenders for the first two generating sets were approved over three years ago, the redemption period for the loan covering their purchase was fixed at 15 years "in view of the observations regarding the probable economic life of those machines made in reports and recommendations of the technical advisers of the Council." The lowest British tender price was some £100,000 above that of Oerlikon's and in reccomending acceptance of the latter's, the consulting engineers pointed out that "the adoption of Swiss-made plant necessarily involved additional risk of unexpected trouble in the early stages of operation and, indeed, some risk of a shorter useful life of the alternator, which was more highly rated than British designs and more highly rated than those of the firm's own designs of which really long-running experience was available."

INDIA

DVC Revenue

Rs60·5 million (about £4½ million) revenue was earned by the Damodar Valley Corporation from the sale of power produced by its various generating stations during the year 1959-60. In all, 1,312½ million units were sold, an increase of 21% on the previous year's total. The DVC power system at present consists of four power houses—one of thermal and three hydro stations. The Bokaro thermal power station has an installed capacity of 150,000 kW increasing to 225,000 kW when the fourth unit is commissioned this year. The hydro stations at Tilaiya, Maithon and Panchet Hill have an installed capacity of 104,000 kW. The total ultimate installed capacity of DVC power houses, including the Chandrapura and Durgapur thermal power stations at present under construction, will be 729,000 kW.

Plan Progress

Total installed capacity for power generation in India in 1960-61, the last year of the second Plan, will be 5,800 MW; the additional capacity created during the Plan period being 2,400 MW. About 35,000 miles of h.v. transmission lines and transformer stations will have also been constructed in the second Plan period. The additional installed capacity expected to be created in the third Plan period will be about 6,000 MW, 2,400 MW from schemes continued from the previous Plans and 3,600 MW from new schemes, including 300 MW from atomic power stations. A programme of power development, transcending State boundaries, by the integration of power systems into State and regional grids has been formulated. Preliminary steps have been taken for the establishment of a grid for the southern region, comprising Andhra Pradesh, Madras, Mysore and Kerala. Ultimately, an all-India super grid system will be evolved.

AUSTRALIA

Against o.h. Lines

Commenting on local suggestions that parklands beautification schemes would be spoilt unless overhead power lines were banned, Sir Fred Drew, chairman of the Electricity Trust of South Australia, has pointed out that placing of lines underground would mean a substantial increase in tariffs. The suggestion to put lines underground originated from Ald J. C. Irwin at a meeting of Adelaide City Council. He maintained that the time had come when costs should not be the criterion. With that view, Sir Fred Drew disagrees.

Report Expected

A report on the economics of a possible pumped-storage generating scheme for South Australia is expected to be presented to the Government by the British consulting engineers very shortly. The consulting engineers involved are Sir Alexander Gibb and Partners, together with Preece, Cardew and Rider. As we reported on 28 May, 1959, they had been asked to make an appraisal of such a scheme under which sea water would be pumped to a higher land, probably south of Adelaide. Gorge sites in the hilly country south of Yankalilla have been drilled by the Mines Department to test the holding capacity of the land.

VIETNAM

Reparations

The construction of the Dan-Him hydro-electric system in Vietnam, under the Japanese War Reparations Agreement, will start at the end of October. An earth dam, 38 metres high and 1½ km long, will be built at a site about 1 km upstream from Dran, to store 150,000,000 cu metres of water. The project is to be in two phases, which will take five years to complete. During the first phase, to be ended in March, 1963, sufficient water will be stored to generate 80,000 kW, which is half the capacity of the total output. At present all the power stations in Saigon produce only 54,000 kW. Output of the plant will be transmitted to Saigon by a 250 km high-voltage transmission line. Total cost of the project is estimated at $US 49 million, composed as follows: $US 29½ million to be paid in cash by Japan; $US 7½ million to be paid by Japan in materials and equipment; $US 7½ million to be borrowed from Japan by the Vietnamese Government to buy materials and equipment; and $US 4½ million, which is the local contribution.

Personalities *in the industry*

Mr W. B. Parkinson

Mr J. C. Stewart

Mr J. N. Smith

Mr R. R. Huitson

Mr T. E. Adams

The new chief commercial officer of the Merseyside and North Wales Electricity Board is to be **Mr W. B. Parkinson,** B.SC., A.M.I.E.E., who is now the board's assistant chief commercial officer responsible for industrial development (*ESH, pages 135-6). He will succeed **Mr W. Gilchrist,** A.M.I.E.E., M.I.H.V.E., who is to retire at the end of July, as we reported on 31 March. Mr Parkinson, who is 53, was born at Preesall, near Blackpool and was educated at Blackpool Grammar School and King's College, London. He began his career with Siemens Brothers and Co. Ltd., Woolwich, as a trainee in their outside contracts department in 1930 and, three years later, joined Liverpool Corporation's Electricity Supply Department as assistant mains engineer. He later became mains technical assistant with the department, a post he held until 1939 when he joined the forces. He served with the Royal Engineers until the end of the war and returned to the Corporation on being demobilised. He was appointed assistant meter and test superintendent and, subsequently, meter and test superintendent, holding the latter post until the electricity supply industry was nationalised in 1948. He then joined the Commercial Department of the Merseyside and North Wales Electricity Board and was later appointed assistant chief commercial officer, being responsible in particular for encouraging the consumption of electricity in the industrial field.

Mr A. W. Brenchley, A.F.C.F.A., M.S.M.A., sales manager, and **Mr H. R. Hetherington,** A.M.I.E.E., M.R.S.H., chief engineer, have been appointed directors of the Hobart Manufacturing Co. Ltd.

Mr E. C. Wayne has joined Aveley Electric Ltd. as a sales engineer. He will be specialising in microwave measurement equipment and aerials handled by the company. Prior to joining Aveley Electric he was, for five years, in the Aerial and Filter Development Department of Marconi's and before that he spent 15 years in the Post Office Engineering Department.

After 22 years as manager of the Glasgow branch office of George Ellison Ltd., **Mr J. C. Stewart,** ASSOCIATE I.E.E., has retired. His successor in that post is **Mr J. N. Smith,** B.SC., A.M.I.E.E., D.R.T.C. Mr Stewart joined the company in 1938 after an apprenticeship at Mavor and Coulson Ltd. followed by 17 years' service with Harland Engineering Co. Ltd., the last eight of which were as manager of their Scottish office. Mr Smith started with Ellisons at Glasgow in 1952, after serving the Belmos Co. Ltd. as a sales and contracts engineer in the Flameproof Switchgear Department. George Ellison Ltd. also announce the transfer of **Mr E. W. Brinkworth,** A.M.I.E.E., from the Leeds to the Birmingham branch office, from which he will operate as sales engineer for Ellison switchgear in the Nottingham area.

Assistant chief engineer of the Eire Electricity Supply Board, which he joined 32 years ago, **Mr W. F. Roe,** M.I.E.E., has been appointed chairman of the Industrial Engineering Co. Ltd., Dundalk. He is to retain his position with the ESB. Mr Roe is also a member of the Council of the Irish Management Institute.

Mr J. F. Earle d'Anyers Willis will become chairman of J. and E. Hall Ltd. with effect from 1 Oct., 1960, to succeed Lord Dudley Gordon, who, as already announced, will retire from the board on 30 Sept.

To mark his retirement as assistant power station superintendent of the North Tees "A," "B" and "C" power stations, **Mr C. S. Henson** was recently presented with a pair of binoculars by **Mr J. B. Jackson,** M.I.E.E., M.I.MECH.E., controller of the North Eastern Division, CEGB, on behalf of friends and colleagues in the Division and the area board. Mr Henson joined the staff at North Tees "A" and "B" power stations as charge engineer in 1940 and became assistant superintendent in 1948. With the building of the new "C" station, his appointment was extended to cover that also.

Two appointments are announced by Associated Electrical Industries Ltd., Heavy Plant Division. **Mr R. R. Huitson,** M.I.MECH.E., becomes consultant to the division and will undertake special duties in connection with the promotion of AEI business in centrifugal compressors and allied apparatus. **Mr T. E. Adams,** B.SC.(ENG.), previously chief engineer, Nuclear Auxiliaries Department, AEI Turbine-Generator Division, is appointed manager of the Compressor Engineering Department, AEI Heavy Plant Division. Mr Huitson served a marine engineering apprenticeship with the Wallsend Slipway and Engineering Co. and, afterwards, transferred to that firm's engine design office. In 1924 he joined BTH—now AEI (Rugby) Ltd.—turbine drawing office and four years later was transferred to the Turbine Engineering Department. Shortly afterwards he was made responsible for the design and development of all types of compressing plant manufactured by the company. He was also associated with Mr Frank (now Air Commodore Sir Frank) Whittle in the development of the Whittle jet engine and was responsible for the compressor design incorporated in the BTH jet engines. During World War II, Mr Huitson acted as liaison engineer between the GE Co., of America and the BTH Co. in connection with problems associated with the installation in RAF aircraft of the GE exhaust gas turbo supercharger. He later designed the gas compressors for the first section of the low separation diffusion plant at Capenhurst, for the Division of Atomic Energy. Mr Huitson is author of several technical papers and was awarded the "Lightfoot" medal in 1949 by the Institute of Refrigeration for his paper entitled "Centrifugal Refrigeration." He was appointed chief engineer, Centrifugal Blower and Compressor En-

*(*Denotes revision to "The Electricity Supply Handbook, 1960.")*

gineering Department on 1 May, 1957, and manager of the department on 1 Sept., 1958. Mr Adams received his education at University College, Cardiff and Cardiff Technical College. Joining BTH in 1936, he served a student apprenticeship course until 1939 when he entered the Turbine Engineering Department. He has been engaged on development of gas turbines since 1939 and was also associated with the design of the first Whittle jet engine and, later, with the design of the two marine gas turbines for the Shell tanker *Auris*. In 1950 he was appointed senior assistant on mechanical design in the Gas Turbine Engineering Department. He became acting chief engineer in the same department in 1957 and was appointed chief engineer, Nuclear Auxiliaries Department, AEI Turbine-Generator Division, Rugby, in May, 1959.

Mr G. A. S. Bartley, T.D., M.A., A.M.I.MECH.E., A.M.I.E.E., has been appointed manager of the London office of C. A. Parsons and Co. Ltd. in succession to **Mr John Packard** who, following a recent illness, has asked to be relieved of some of his responsibilities. Mr Packard will, however, remain at the London office as deputy manager. Mr Bartley has been a prominent member of the London staff for a number of years. He was educated at Winchester and Cambridge and started an apprenticeship with Parsons in 1929, continuing with the firm ever since, apart from six years' war service with the RE's during which he was Mentioned in Despatches. About 1935 he was personal assistant to the late Sir Claude Gibb. Shortly after the war he took up duties at the London office.

Mr H. A. Andrews has been appointed general manager of Power Auxiliaries Ltd., member company of the Plessey Group, specialising in the manufacture of seamless flexible, metallic hose widely used in the aircraft, nuclear and marine industries. Mr Andrews joined the company in 1939 and worked on the design and development of plugs, sockets and prototype electrical installations for aircraft. From 1940 until 1952 he was resident Plessey engineer with several of the main aircraft manufacturers in this country. After 1952 Mr Andrews was, successively, general manager, Plessey (Northern Ireland) Ltd.; general manager, Wiring and Connectors Division at Rotherham, and was appointed divisional manager of the Wiring and Connectors Division at Swindon in 1958.

Dr G. L. J. Bailey has relinquished the position of superintendent of the Mond Nickel Co.'s development and research laboratory in Birmingham and is transferring to London to become manager of research. **Mr E. J. Bradbury** succeeds Dr Bailey as superintendent of the Birmingham laboratory.

Sir Gordon Radley, K.C.B., C.B.E., PH.D., M.I.E.E., who retired in May from the position of Director-General of the GPO, is to devote part of his time to work with the English Electric group of companies, particularly in the development of telecommunication equipment for world markets. He has been elected a director of three of the subsidiaries, Marconi's Wireless Telegraph Co. Ltd., Marconi Instruments Ltd. and the English Electric Valve Co. Ltd. In addition he has been elected to the board of the associated company, Marconi International Marine Communication Co. Ltd.

AEI Lamp and Lighting Co. Ltd. have appointed **Mr E. V. Bowers** as manager of the Southern Region, operating from 132-135 Long Acre, W.C.2, in succession to **Mr E. J. Melville** who is transferred to headquarters' staff where he will negotiate nationally with certain customers in conjunction with regional managers. Mr Bowers was managing director of BTH Sound Equipment Ltd. from 1956 until January of this year, when he was appointed deputy manager of AEI Lamp and Lighting Co. Ltd., Southern Region. He still retains a directorship of AEI Sound Equipment Ltd. Mr Melville joined the BTH Co. at Leeds as manager (lamps) in 1930 and was appointed sales manager of Northern area lamp and lighting in 1935. He moved to London in 1947 and was appointed sales manager of Southern area lamp and lighting two years later. In 1955, when BTH changed over to AEI Lamp and Lighting Co. Ltd., he became Southern Region manager. His office will be at Crown Hse, Aldwych. Mr Bowers joined his brother's radio wholesale business in 1924 and three years later became a partner. In 1930 he formed his own company, Delta Radio Distributors Ltd., and five years later that concern merged with Henderson's Wholesale Electrical Co. Ltd. and Mr Bowers became a partner in charge of the London office. He served in the Royal Navy during the war and was awarded the M.B.E. (Military). In 1946 he was demobilised with the rank of Commander. In 1949 he joined BTH to market marine radar equipment and later was appointed general manager and director of Multi Broadcast (Engineering) Ltd.

Mr T. H. Cook, B.SC.(ENG.), M.I.E.E., has been appointed chief applications engineer of the Morgan Crucible Co. Ltd. He was previously Carbon Department technical sales promotion manager. He has travelled widely for Morgans, and will be attending the New Delhi meeting of the IEC in November.

Captain S. Harrison-Smith, head of the nuclear power section of Swan Hunter and Wigham Richardson Ltd., has been appointed head of the firm's engineering department at Neptune Works, Newcastle-on-Tyne. He will continue as head of the nuclear power section.

After 26 years' service with Hoover Ltd. **Mr S. T. Matthews** has retired from the board and from his offices with the company.

Simms Motor Units Ltd. have decided on an extensive reorganisation of their electrical manufacturing facilities. As a result of this constructive development, **Mr E. A. Moore,** A.M.I.MECH.E., A.M.I.PROD.E., A.M.B.I.M., has been appointed to the personal staff of Mr J. Ayres, the managing director, and will be responsible for recommending and implementing such changes as may be necessary. Mr Moore had earlier been chief production engineer with Black and Decker Ltd. and works manager of the British Tap and Die Co.

London Transport announces that **Mr W. A. Worth** has been appointed an officer of the executive, with the title of purchasing officer, as from 1 July. He will be responsible to **Mr A. E. Shave,** supplies officer, for the control of the work of the purchasing office. Mr Worth, who is 59, joined the London General Omnibus Co. in January, 1915, in the Engineer's Department, transferring to the Purchasing Department in May, 1920. After five years as senior assistant to the

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Research in Norway

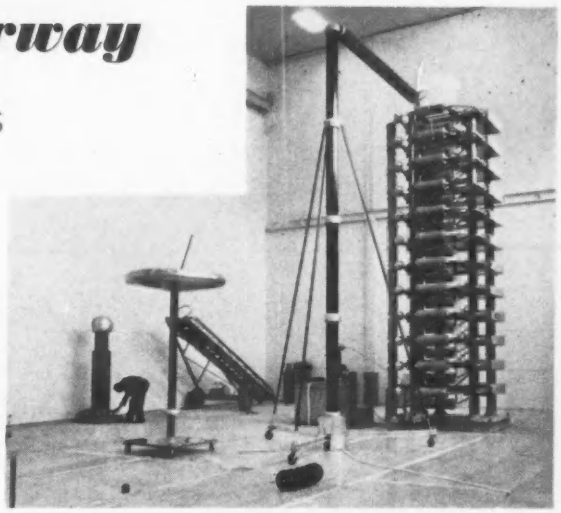
NEW TRONDHEIM LABORATORIES FOR SUPPLY INDUSTRY

THIS year new electrical research laboratories have been opened at Trondheim by the Norwegian Research Institute of Electricity Supply. This is an independent research organisation which is supported by the State and the electricity supply industry, including the power companies. The siting of the laboratories has been specially chosen so that they adjoin the Norwegian Technical University and it is visualised that there will be close co-operation with the University. This has a two-way benefit, for in equipping the laboratories an economy has been possible by arranging to utilise the University laboratories so far as chemical, physical and metallurgical work is concerned.

The Research Institute is housed in a four-storey building with an adjoining high voltage laboratory. It has a total floor area of 22,500 sq ft and the building cost in all £150,000 with an additional £110,000 for equipment. The work of the Institute is divided into four sections—power engineering; high voltage work; electrical heating, and electronic and measurement department. The electronic work, however, is not intended for research but is employed in developing apparatus for use within the Institute's own laboratories.

High Voltage Laboratory

The equipment of the high voltage laboratory includes a surge generator rated at 2·4 MV and 60 kilojoules. Power frequency supply is available from a 600 kV, 600 kVA transformer (cascade connected in one tank with the tank at 300 kV to earth). The test bay is covered with aluminium plate 6 mm thick. For the measurement of surge voltages there are available resistance voltage dividers, oscilloscopes and crest voltmeters, while for 50 c/s work voltage measurement is by crest voltmeter with capacitance voltage divider. In addition, a 1 metre sphere gap is provided as well as artificial rain-making apparatus.



HV laboratory with 2.4 MV surge generator and voltage divider

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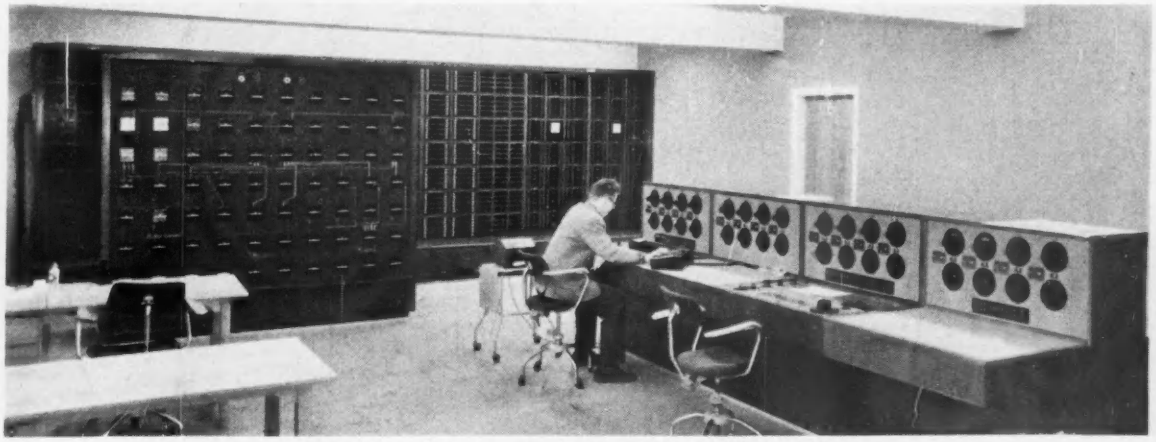

General view of a.c. network analyser operating with 150 c/s supply

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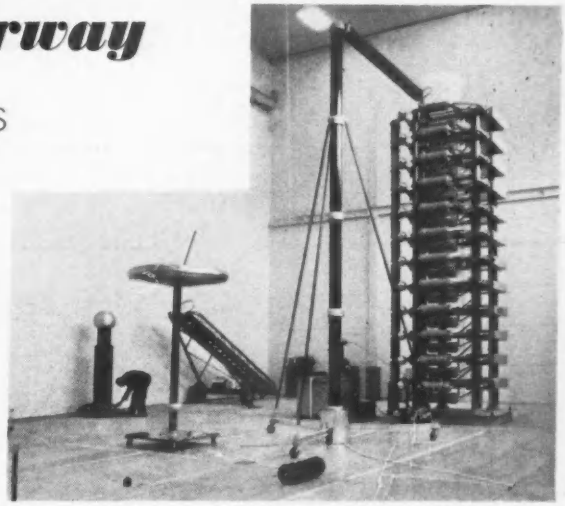

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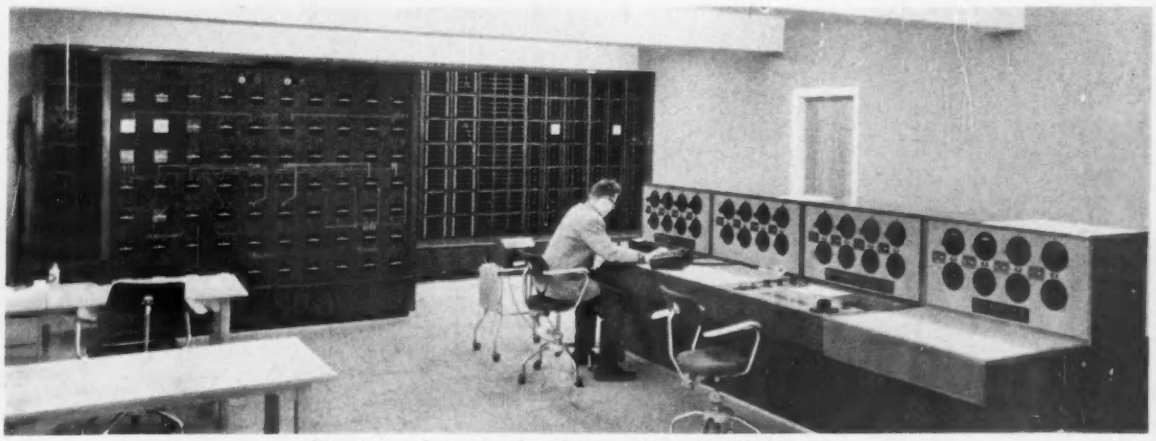
The laboratory devoted to low voltage high current working is equipped with a transformer having a continuous rating of 416 kVA but capable of giving 50 kVA, r.m.s. for one second. In addition to the usual a.c. and d.c. supplies for the electro-heating laboratories there are available 10 kc/s, 25 kVA and 27 Mc/s, 5 kVA supplies for special apparatus. For the investigation of special heat transfer problems a Beuken model is available built up with c and r elements.

These laboratories will enable many of the problems of electricity supply to be tackled in the expanding electrical economy of Norway. It is estimated that the total expenses of the laboratory at the present time will be of the order of £36,000 per annum. We are indebted to the Institute for this information.



General view of a.c. network analyser operating with 150 c/s supply

equipment for industry

"Two-in-one" foot switch

TWO circuits can be closed in sequence by increasing pressure applied to a foot switch which has recently been added to the "Herga" range. This type of switch has many applications in industry, particularly for certain types of spot welders. The operator receives warning when the second circuit is about to be closed by the increased pressure required to complete the switch travel. The switch has two poles rated for 5 A at 250 V a.c. This switch, and a "press-on," "press-off" switch are two recent additions to the range of heavy duty foot switches described in the latest edition of the Herga leaflet. Foot switches are housed in substantial light alloy castings. The switches have a neat appearance, there is no external pedal, and they can be simply wired into a circuit. Other switches in the range are suitable for maximum currents of 15 A. *Herga Electric Ltd., Wallingford Rd, Uxbridge, Middlesex.*

Flame-proof control gear

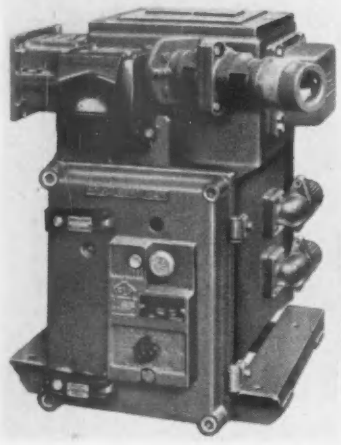
FOR the control of small motors, Belmos have added to their range of flame-proof control gear a gate-end box. Known as the SGU30, this box is designed in accordance with NCB recommendations and may have earth leakage protection, intrinsically safe earth fault lock-out circuit and low voltage control circuit. The unit has two auxiliary sockets which can be used for remote control and sequencing, and a rotary switch can be used to select the operation required. The welded steel enclosure consists of two flame-proof compartments, the upper containing a triple-pole reversing isolator suitable for breaking 240 A at 650 V 0·25 power factor. The lower chamber contains the protective equipment and contactor, mounted on a withdrawable chassis. The contactor has a continuous rating of 30 A and will make and break on 240 A. By using a specially designed arc-chute, blow-out coils have been dispensed with. The intrinsically safe circuit ensures that the contactor cannot be closed on to a earth fault. The remote control circuit incorporates pilot-to-earth fault protection and in both these circuits plug-in sealed relays have been used. *The Belmos Co. Ltd., Bellshill, Lanarkshire.*

Fault-free floor-warming

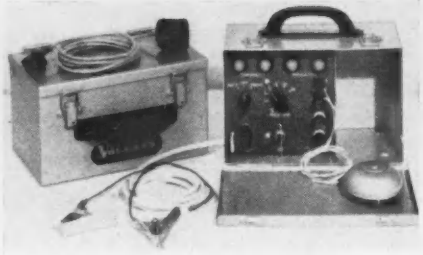
THE practice of casting floor-warming cables in a concrete screed although preferable from many aspects has one serious disadvantage. If the cable insulation is faulty, or if it is damaged during installation, the flaw may only be detected after laying is complete and the concrete has hardened. Location of the fault is then difficult and entails breaking up the floor. To overcome this objection, Volex have introduced a testing monitor for these cables. The ends of a cable to be checked are connected to the monitor before the screed is laid. As concrete laying proceeds, any fault in the insulation or damage is said to be immediately indicated by visual and audible alarm. The tester will also indicate occurrence of a conductor break. The monitor is housed in a steel carrying case with appropriate leads and connectors. It may be energised either from a 240 V a.c. supply or from a 12 V battery. For insulation testing, a triode-operated d.c. amplifier energises an alarm if the insulation resistance falls below a pre-set value, which may be between 1 and 10 megohms. When the set is first energised, operation of the tester is automatically checked since the alarm operates until the valve cathode heats up. A second relay indicates a failure of conductor continuity. This circuit is energised through a low voltage double wound transformer. The "Voleata" cable monitor can be used with two or more cables in series, provided their total resistance does not exceed 200 ohms. *Volex Electrical Products Ltd., Salford 6.*

Switch-fuse range extended

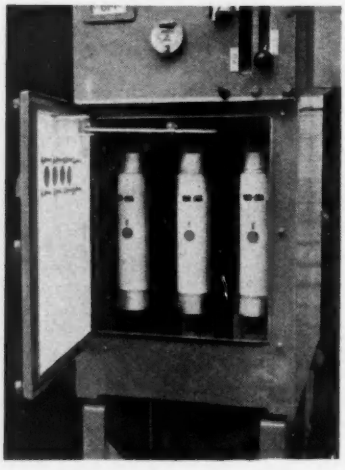
EXTENSIONS to their range of switch-fuses are announced by the Brush Electrical Co., who have been quick to exploit the development of high current rated powder-filled fuse-links. These fuse links have been developed by Line Equipment Ltd., in a range which includes fuses suitable for 90 A at 11 kV and 125 A at 6·6 kV. The switch-fuse units have an air-insulated fuse chamber, claimed to have certain advantages over the oil-filled type. These units are particularly suitable for transformer protection and the recent extension of their range means that they can now be used with transformers rated up to 1·5 MVA at 11 kV. The switch-fuses are automatic in operation. If a short circuit occurs on the system, the powder-filled fuse will blow and an auxiliary detonator in the fuse ejects a plunger to trip the switch mechanism. These switch fuse units have been successfully tested to ASTA requirements, and works tests have shown that their temperature rise is in accordance with BS 2962. They can be used singly or as part of a multi-panel switchboard in conjunction with fault-making switches. They are also suitable for indoor or outdoor service. Fuse-links are available for 3·3 kV to 11 kV and rated from 75 to 250 MVA. *Brush Electrical Eng. Co. Ltd., Loughborough.*



Flameproof gate-end box by Belmos for supplying small motors has a contactor rated for 30 A, 650 V, 3-phase



The "Voleata" test set continuously monitors insulation and continuity of floor-warming cables during screed laying



Extensions to the range of Brush automatic switch-fuses now enables them to be used for transformer protection up to 1·5 MVA at 11 kV.

for the electrical trade

Popular Electrolux cleaner

A CYLINDER all-purpose cleaner at the more accessible price of £19 19s, "Electrolux 65," follows the more expensive Model 64 announced last January. The retail price includes tough plastics attachments for floor, furniture, wall cleaning and dusting. One noteworthy accessory is a "two-way" carpet nozzle. The head of this has two inlets for the removal of obstinate particles or straightforward dust. They are on opposite sides of the head and replace each other as it is rotated. Model 64 is claimed to be particularly quiet in use and is suppressed against radio and television interference. Plastics and alloys employed in its construction make it light in weight and—in the case of the ivory-finished cylinder and accessories—easy to clean. This appliance carries a two-year guarantee. *Electrolux, 153 Regent St, W.1.*

Heat-light fitting

LIGHT combined with radiant heat can be provided for the bathroom by a double lamp infra-red fitting, "Infralux." Two 250 W lamps are mounted side-by-side to point downwards from a casing which is designed for easy ceiling fixing. No extra wiring or switching is necessary. The casing, 13 in. long and 7 in. deep, is in green, white, yellow or pink polypropolene with black base and rim. Both lamps are guaranteed for 1,000 hours. "Infralux," which is an "Xcel" product, is priced £4 19s 6d including purchase tax. *Selex Electric (Kirkby), Yardley Rd, Industrial Estate, Kirkby, Lancs.*

Garbage disposer

A NEW garbage disposal unit for commercial or domestic use, the "Tweeny De-Luxe," was introduced recently. It has a 5½ pint capacity grinding chamber and is quite simple to install employing a special suspension device. The single wing nut which secures the couplings can be seen in the illustration below. This unit, of the usual centrifugal type, has a double edged shredder blade ring, the life of which can be prolonged by the use of a control unit for periodically altering the direction of the impeller. This automatic controller, an optional extra, includes a safety cut-out which operates if the chamber is misused. The ¼ h.p. motor is totally enclosed, and a built-in acoustic hood deadens noise. The unit, it is claimed, will dispose of any organic material from paper to marrow bone. Price, £48 4s 8d including purchase tax. The automatic controller, £4 15s extra. *The Haigh Engineering Co, Ross-on-Wye, Herefordshire.*

TRADE PUBLICATIONS

I.C.I.—12-page brochure of Titanium weight tables. I.C.I. Ltd., Metals Division Headquarters, P.O. Box 216, Birmingham 6.

BAVA.—24-page technical booklet (publication No. 2804) on Aerofoil bladed fans. Sturtevant Engineering Co., Southern Hse, Cannon St, E.C.4.

PYE.—Large booklet describing telemetry schemes, telecontrol and telealarm equipment. Pye Telecommunications, Newmarket Rd, Cambridge.

ELECTROTHERMAL. — 22-page illustrated booklet, "Electronic Components," describing resistors, valve retainers, wiring jigs, etc. Electrothermal Engineering, 270 Neville Rd, E.7.

BILL.—New price list, No. PL660, operative from 27 June, 1960. Bill Switchgear Ltd., Aston La, Perry Barr, Birmingham 20.

STC.—Eight-page new bulletin, "Components News," June, 1960. Standard Telephones and Cables, Connaught Hse, Aldwych, W.C.2.

MALAG.—Descriptive leaflet and price list of controlled storage heaters. Mantle and Butterworth, Rawtenstall, Rossendale, Lancs.

JETUBE.—Leaflet No. V60 on Vitreous Enamelling. The Incandescent Heat Co., Corwall Rd, Smethwick, Birmingham.

Convector and radiant heater

A VERSATILE new room heater, the "Radiant K" by Ekco, employs the unusual combination of infra-red element and convector heater. This is a 2½ kW model, the heavier load of 1½ kW being that used for the thermostatically controlled convector. Optional use of the infra-red silica element, as an alternative or supplement to heat from the convector unit, makes this fire adaptable and economical. A pleasing touch is the amber lamp within the casing which produces a comforting glow even when the radiant fire is switched off.

This heater is easily portable, weighing only 20 lb. It is 7½ in. deep by 23 in. square, approximately, on its front face and finished in hammered bronze stove enamel with a gold-colour grille and reflector. Price, tax paid and complete with 6 ft flexible three-core cable, is £12 15s. *E. K. Cole, Southend-on-Sea, Essex.*

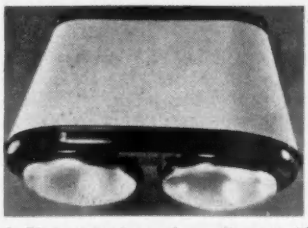
Commercial 'fridge

A NEW Lec refrigerator suitable for hotels, cafés, general shops, etc., will be introduced soon. The new model, S.130, is tall, occupying the minimum floor space for its 13 cu ft capacity. It has adjustable shelves giving 25 sq ft of storage area and an ample freezer. The compressor, Lec's "Vertimetic" one-cylinder unit, is said to have a very low consumption. Price: £115. *Lec Refrigeration, Bognor Regis, Sussex.*

Fan-radiant heater combination

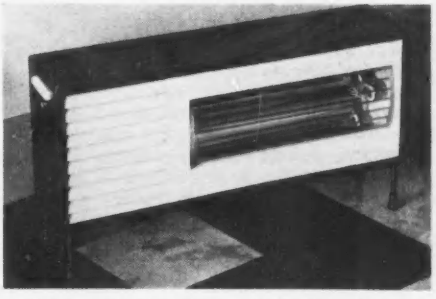
A COMBINED infra-red and fan heater unit is manufactured by Westool. It has a substantial rating of 2,750 W divided between a 750 W infra-red radiant element and a 2,000 W fan element with three heat control. The two functions are controlled separately.

Warm air from the fan heater is emitted through a louvred grille beside the radiant elements reflector. The attractive light and dark grey cabinet has a row of push-button control switches in the side with a pilot light under them. Dimensions: 25 in. long by 9½ in. high and 6 in. deep. 3½ in. legs can be supplied. Flex, 6 ft long, goes with the fire, which costs £15 15s including purchase tax. Selling agents, *C. H. E. Gillott Ltd., 6 Russell Gdns, Kensington, W.14.*



◀ "Infralux" heat-light unit £4 19s 6d

A 5½ pt capacity garbage disposer, "Tweeny-De-Luxe," price £48 4s 8d ▶



Westool's 2,750 W combined infra-red and fan heater. £15 15s

PROBLEMS AND PRACTICE

We welcome contributions to this feature; those published will be paid for at our standard rates. There must be many problems encountered in day-to-day electrical work, or useful ideas or tools devised to make it easier; all make instructive reading.

Positive Mercury Switching

A STRAIGHT type mercury switch was operated by a float in a tank. The movement of the float would, in the dead horizontal position, break the mercury column and switch off the pump, but the mercury would not run along the tube to give a positive break. This resulted in the pump being switched off and on frequently, with small variations of liquid level.

The fault was overcome by strapping a horizontal sealed glass tube, inside which was a loose ¼ in. steel ball, to the rocker arm above the mercury switch, which gave a positive mechanical bias to the switch in either direction. The switch then opened only at the predetermined high, and closed at the low, level as controlled by the float.

This float-switch is installed in a circuit controlling a 100 gall/hr centrifugal pump arranged to drain a low-lying patch in the writer's garden. Before installation the soil was consistently sour and nothing would grow; today there is considerable improvement. An open-topped 45-gallon steel drum was sunk in the ground leaving about 6 in. projecting above ground level. Holes were then punched in the sides and bottom from the inside with a long pointed steel rod, easily the best way of punching holes without bounce and terrific din.

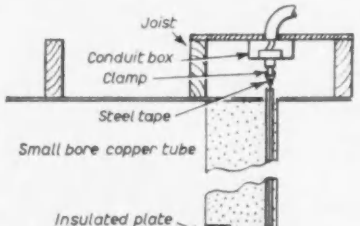
The float switch is mounted on top of a wooden platform and is controlled by a flexible wire running over two grooved pulleys. The wire terminates at one end in a counterweight and at the other in the copper float, movement of the wire actuating the mercury float-switch by a forked lever which straddles the flexible wire at a mid-point between two knots in the wire, backed by porcelain beads. Contact between the beads and the forked lever operates the switch, the differential being controlled by the distance between the two beads.

The advantage of this assembly over actuating rods and brackets is that the whole platform, switch and counterweight assembly can be removed from the tank as a single unit for cleaning purposes. A considerable amount of trash accumulates in the bottom of the tank. The motor and pump is a separate unit, which is connected to the mains by a three-core cable and three-pin plug. Connection between the pump and mercury switch is by a two-core cable and two-pin plug and socket.—*K. Coombs.*

Bathroom Switching

YOUR contributor "Megohm" does not appear to favour cord switches in bathrooms. I once had a customer who had a similar rooted prejudice, but in his case it was not possible to site the switch "in an accessible position outside and immediately adjacent to the normal access of the door" (IEE Reg. 314, Biii), because of closely butting architraves. So we devised an arrangement whereby the light could be switched from inside the bathroom but which did not appear to infringe the regulations.

As the diagram shows, the "switch" is a barrel type spring-acting push with an insulated knob and switchplate which, when pressed, actuates a press/on, press/off type of electric switch, located in the roof, by remote control. The latter comprises ordinary electricians' steel tape, which is made to take a solid push, enclosed within a thin bore copper tube, with metal clamps at either end to attach the tape to both switch dolly and plunger. As a further precaution, the fixing screws in the bathroom are of nylon and the push is out of reach of the bath.



Remote control of a push-on/push-off switch in the ceiling above the bathroom is by steel tape coupled to an insulated spring plunger, one way of overcoming IEE Regulation 314, Biii

I think that a wholesale condemnation of cord switches is out of place, however, and there are many situations in which they are preferable to wall switches. In my own kitchen we use a cord switch to control a fluorescent light fitting over the sink. The cord is not unsightly and it is most conveniently located for operation and is certainly the safest form of lighting control to use in this position.—"*Microhm.*"

Millionth Chance

ONE lovely June day, with just an occasional breeze, a mains assistant engineer, aided by a junior, was engaged on the routine task of checking the medium voltage system in a northern town. They had removed the cover of a pavement-sited underground link-box and were intent on voltage testing when, quite unobserved by either of them, a light breeze deftly consigned a foil-and-paper cigarette wrapping across the road, smartly round them and right into the open box where it landed, foil side down, across two metal contacts at different potential. A sharp crack, a spurt of green flame and the engineer's fingers were burned before he could draw them away, quick though he was. Fortunately, the burns were neither extensive nor severe; in fact he was back to normal in a few days. But the incident aptly illustrates the unforeseeable, unpredictable sort of incident which can occur to the most experienced engineer, no matter how careful or dextrous he may be.—*E. James.*

Shock Treatment

NO, this is not an alternative to Holger Nielsen, but is an instance of a different kind of shock treatment, an electricity-bill shock. Some years ago a meter reader came to me with a customer's record card and said that the meter had a × 10 mark on the dial, which was not recorded on the card. Sure enough, for the past five years he had only been paying one-tenth of the sum he should have been paying. His bill had averaged £6 a year, plus fixed charge, for which he had been using a 2 kW fire for most of the time. The fault was, however, the meter readers.

Regardless of this, I submitted a bill for some £270 for current used and not paid for, as I was entitled to do and, as I expected, it brought him round in great haste and distress. After explaining what had happened, I pointed out that surely he must have known that, with a fire going all day long in the office, his electricity bills had been far too low. He said that he had never thought about it and I piled on the agony for a while before I relented but pointed out that, in future, his bills would be up by about 900%. In vast relief he agreed. Shock treatment had been successful. But can you imagine the long argument which would otherwise have ensued with the subsequent account? —*Ion.*

News of the Week

H.P. CURB RESTRAINS 'FRIDGE SALES

and washers decline in Area Board sales

DESPITE the credit restrictions introduced at the end of April, refrigerators have continued to make some headway in terms of area board sales whereas washing machines, hit by the h.p. curb, have shown an appreciable decline. The May figures, issued last week by the Electricity Council, put 'fridge sales at 22,513, an increase of 44% on the preceding month, and more than 500% up on January last.

Even so, 'fridge sales in May were well down on the total of 30,556 for May, 1959. The fall, of over 26%, indicates the restraining effect of the h.p. curb on a vigorous seasonal trend that might otherwise have reached record sales figures.

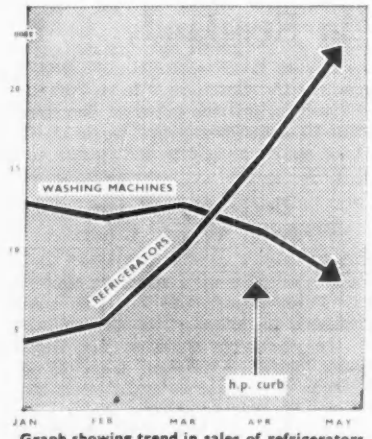
Washing machines, on the other hand, while showing a slight falling off during the first three months of the year, began to decline quite rapidly from the end of April. The May figure of 8,222 is 25% down on the total of 11,068 sold the month before.

Although figures for manufacturers' deliveries of domestic refrigerators are not available for May, the total for April, at 155,800, was the highest ever, exceeding by quite a large margin the previous record total of 136,300 in May, 1959. This suggests a high level of stocks at retail outlets, but the selling position seems healthy enough on the surface. Apart from refrigerators, h.p. sales of electrical and radio goods dropped by some 13% during May.

As the table above shows, all appliance sales by area boards in May, with the exception of storage heaters, are down on the same month last year, but over the 12 months ending 31 May, all except washboilers show appreciable gains, 'fridges being nearly 50% up.

Appliance Sales by Area Boards	Sales in month ended 31 May, 1960		Sales in 12 months ended 31 May, 1960	
	Total	% change over May 1959	Total	% change over previous 12 months
Cookers ...	26,615	− 4·8	343,817	+13·1
Water Heaters:				
Immersion	26,558	0·0	193,553	+12·6
Storage ...	6,404	+24·2	66,918	+23·4
Washboilers	4,789	−12·2	63,299	−16·3
Washing Machines ..	8,222	−39·7	152,097	+ 7·3
Refrigerators	22,513	−26·3	164,406	+47·8

When assessing these figures it should be borne in mind that sales by area boards represent only a part of the total sales throughout the country.



Graph showing trend in sales of refrigerators and washing machines by Area Boards in 1960.

Earthing to water pipes "deplored"

THE practice of earthing electrical installations to water supply pipes is "deplored" by Walsingham (Norfolk) Rural District Council. In a letter to the local committee of the Eastern Electricity Consultative Council they state that the practice has on previous occasions led to the destruction of water ferrules by electrolysis and caused loss of water and expense.

The manager of the board's sub-area told the committee that he would like an opportunity of investigating the matter which, he suggested, should in the first place be discussed between the EEB and the Rural District Council.

Problems arising from earthing to water pipes were referred to in our 7 July (p. 10) and 23 June (p. 998) issues.

Manchester Building Centre

THE new Manchester Building Centre, which is affiliated to the Building Centre, London, was officially opened to the public last week. Occupying two former cotton warehouses in Portland St, the Centre features a permanent, but changing exhibition of materials, products and techniques used in modern buildings, with demonstrations and films.

DEVELOPMENTS IN INDUSTRY

New 'Fridge Factory

DESPITE the h.p. curb, Merseyside Engineering (Refrigeration) Ltd. (whose merger with West German Hans Liebherr was announced in our 16 June issue) are to go ahead with their plans to build a new factory in Caernarvonshire.

"There are no snags about the negotiations—they are going on smoothly," said Mr. C. Angelus, joint managing director. Although the h.p. restrictions had made them hesitate about the Caernarvon project, "we now feel that the difficulty will be overcome in the near future and enable our plans to proceed."

Between 5% and 10% of the employees would be skilled, and no difficulty in training was anticipated. The current negotiations are concerned with Government financial aid in building the factory.

Split Acquisition

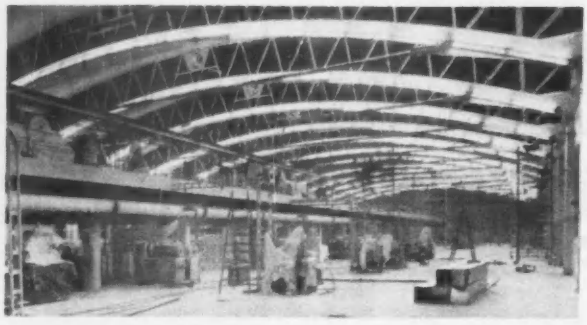
TWO separate divisions of a company have each been acquired by separate firms. The connector division of Films and Equipments Ltd., manufacturers of Jones plugs and other types of connectors, has been acquired by Cannon Electric (Gt. Britain) Ltd. The transfer includes the entire staff and sales direction is now under the control of Mr George Stone.

The Recording Division of F. and E. has been taken over by Aviation and Electronic Equipment Ltd. and will continue to operate from the same address, 138 Wardour St, W.1. Films and Equipments has now ceased to function as a separate company.

Wolf Expansion

THE Hanger La, Ealing, factory premises of Arrow Electric Switches Ltd. are being purchased by Wolf Electric Tools Ltd., their next-door neighbours. Mr G. M. Wolfe, managing director of Wolf Tools, states that when Arrow finally decided to move from Ealing, in order to concentrate their production under one roof, they honoured a long-standing arrangement, whereby Wolf's were given first option on their Hanger La works, and a mutually satisfactory basis for the transfer of the premises has been reached.

The transfer will take effect early in 1961, but Mr B. C. M. Skinner, sales director of Arrow Electric Switches Ltd., declines to indicate yet to where the latter concern is moving.



Reversing normal building practice, this extensive factory lighting scheme using Philips fluorescent lamps was installed at an early stage at the works of Van der Bergh and Jurgens Ltd., Cheshire. Building work is now going on under permanent lighting, without the need for temporary installation

Small man's exports = £10m a month

IF the many thousands of small- and medium-sized businesses whose managements never think of exporting their goods were to make an effort to do so, it could add £10 million a month to Britain's export trade. The Chancellor could balance his account, lift his restraints and let expansion go.

This advice was given by Sir Frank Bower in his presidential address to the centenary annual meeting of the Association of British Chambers of Commerce in London last week.

But how could a man be persuaded to venture into an unknown and more competitive market when he could sell his output at home without much effort and with a satisfactory profit? he asked. One solution was for Chambers of Commerce, which had export committees, to set up information bureaux to help.

"It is fruitless to exhort a trader to export as a form of self-sacrifice for some distant cause," Sir Frank added. "It is necessary to show him that he can do overseas business at a profit. He may be glad of alternative outlets if the home market should turn sour on him and any additional sales, even at cost, can help him to carry his overheads."

The case for resale price maintenance was argued by delegates in support of a resolution passed by the association that "it would not be in the public interest to deprive suppliers of the right to prescribe and enforce resale prices for goods supplied by them."

The resolution was said to be in support of individual resale price maintenance and did not support collectively operated maintenance. If the power of the individual supplier to enforce the prices he required was to be eliminated "we shall undermine his position in the markets which are more and more becoming the backbone of our export effort."

ADA RAPS GOVT.

FORCED to cut labour strength at their works because of falling demand due to the h.p. curb, Ada (Halifax) Ltd., manufacturers of domestic appliances, have sent telegrams to the Prime Minister, the President of the Board of Trade and Halifax's MP (Mr Maurice Macmillan) complaining that fluctuating Government policies were bad for people's jobs and that sudden changes made planning almost impossible.

The firm completed extensions at its works only a few days before the Chancellor reimposed credit restrictions at the end of April. In the last few weeks the firm has laid off more than 100 workers through redundancy.

Progress in Railway Warning

GOOD progress is being made in the scheme to equip five principal routes of British Railways with a new electrical type of automatic warning system, reports the British Transport Commission. After the five routes have been fitted by 1963, most main lines will be similarly equipped within another five years.

The system, which warns drivers whether distant or warning signals are on or off, is unaffected by heat, snow or ice, and can be used with any form of traction—steam, diesel or electric.

201 more farms supplied

DURING April and May the Eastern Electricity Board connected 201 more farms to the electricity supply, bringing the total to 26,252.

Factory Acquired

A FACTORY covering 3½ acres has been purchased by W. H. Allen Sons and Co. The premises, formerly occupied by John P. White and Sons, is adjacent to the company's main Queens Wks at Bedford, and will enable Allen's to move the manufacture of electrical control gear from their Biddenham works (also at Bedford) and so concentrate all the manufacturing side of their activities on the one enlarged works area. The Biddenham workshops will then be available for use as the company's general research centre. The purchase will not affect activities at the firm's gearing works at Pershore.

New Turriff H.Q.

THE head office staff of George E. Taylor and Co. (London) Ltd., electrical and mechanical engineers and contractors, are to move in the near future from Southwark Bridge Rd to the new 12-storey Turriff building on the Great West Rd, Brentford, Middx. The move affects the commercial and technical divisions of the company.

The firm is a subsidiary of the Turriff Construction Corporation Ltd., and will continue to maintain an area office in Southwark Bridge Rd.

Extending Hydro

THE Government were examining the problem of rural electrification in the area of the North of Scotland Hydro-Electric Board with a view to deciding whether it would be possible to aid the board in the high capital cost of providing an electricity supply to areas and islands in outlying areas, the Secretary of State for Scotland said in the House of Commons last week.

An MP had suggested that although the Government had no statutory power to help in this kind of provision, such power was contained in Section 7 of the Local Employment Act. Mr. Maclay said he was not sure that this power applied, but would examine it.

Reinforcement in Scotland

TWO reinforcement schemes have been approved by the South of Scotland Electricity Board. The first is at Grangemouth where a new 132 kV substation is to be installed at Wholeflats. The substation will be supplied from the grid substation at Bainsford and will be equipped with two 60 MVA 132/33 kV transformers and seven 33 kV switch equipments.

The scheme also provides for the raising of the operating voltage of the Bainsford-Wholeflats overhead line to 132 kV. The cost is estimated at £266,000.

The second scheme is to reinforce the supply to Broxburn and Abercorn. A 33/11 kV substation will be established at each place, fed from the grid supply point at Bathgate. In addition, the operating voltage will be increased from 6.600 to 11 kV. Estimated cost is £198,000, and the work will be completed in 1962.

Electricity at the Royal Welsh Show

EVERY aspect of the part which electricity can play in making the life of the Welsh farmer and his wife more profitable and pleasant will be exhibited at the electricity stand at the Royal Welsh Show, Welshpool, from 20 to 22 July. The stand is organised jointly by the Merseyside and N. Wales Electricity Board and the British Electrical Development Association.

"Deferment of Acceleration"

THE Government's recently announced "deferment of acceleration" in the rate of building nuclear power stations would be offset to some extent by the increase in the conventional programme, the Parliamentary Secretary to the Board of Trade stated in answer to a question in the House of Commons last week. The President of the Board of Trade was discussing the effects of the re-phasing with the plant manufacturers. It was unlikely that joining Euratom would materially affect the size of the industry, he added.

50 COOLING YEARS

SINCE 1910 the Davenport Engineering Co., who celebrate their jubilee this year, have been concerned in the development of water-cooling techniques for industry.

From early projects in designing and manufacturing cooling units for dealing with water from reciprocating mill engines to modern cooling towers for power stations (including a large mechanical draught cooling tower currently under construction for the UKAEA's Windscale plant) the company has established itself as a leader in its own specialised field of engineering.

The history of Davenport is related in an illustrated booklet entitled "Fifty Years' Endeavour in the Service of Industry" published by the firm last week.

Fuel and Power: Advisory Council Changes

THE Scientific Advisory Council to the Ministry of Power has been reconstituted and the terms of reference amended to emphasise that its advisory functions cover all aspects of research and development concerned with fuel and power from the laboratory to industrial applications, the Minister of Power announced this week.

The new terms of reference of the Council, which is renamed the Advisory Council on Research and Development, are:

To advise the Minister of Power on research and development in relation to his statutory duty of securing the effective and co-ordinated development of coal, petroleum and other sources of fuel and power in Gt. Britain, and of promoting economy and efficiency in the supply, distribution, use and consumption of fuel and power, whether produced in Gt. Britain or not.

To advise the Minister of new scientific and technical knowledge or applications of knowledge throughout the world, which in the opinion of the Council should be taken into account in the performance of his statutory duties.

To keep the whole field of fuel and power under continuous review with the object of identifying problems needing research and development and advising the Minister of these problems with a view to discussion with the industries concerned.

In order to ensure the co-ordination of the advice which the Minister receives on research and development matters, the Council will take over the functions of the Minister's Fuel Efficiency Advisory Committee. This committee is accordingly being wound up and the Council is being invited to appoint a standing committee on fuel technology.

Members of the Advisory Council on Research and Development are: *Chairman:* Sir Alexander Fleck. *Deputy Chairman:* Capt. (E) W. Gregson. *Members:* Lt.-Col. S. J. M. Auld (oil industry consultant), Dr C. M. Cawley (chief scientist, Ministry of Power), T. B. Clark (ICI Ltd.), Sir Josiah Eccles (deputy chairman, Electricity Council), W. K. Hutchison (deputy chairman, Gas Council), W. A. Macfarlane (managing director, National Industrial Fuel Efficiency Service), Sir Harry Melville (secretary, DSIR), L. Rotherham (member for research, CEGB), Prof. M. W. Thring (University of Sheffield), Dr F. A. Vick (deputy director, Atomic Energy Research Establishment, Harwell), A. H. A. Wynn (scientific member, Coal Board). *Assessors:* P. Chantler (economic adviser, Ministry of Power), Dr E. Lee (director, Stations and Industry Divisions, DSIR), H. T. Ramsay (director, Safety in Mines Research Establishment, Ministry of Power). *Secretariat:* Dr E. N. Eden and E. W. Prior (Ministry of Power).

Fuel Oil Increase

CONSUMPTION of fuel oil in the UK in the first quarter of 1960 amounted to 5 million tons compared with 3·8 million tons in the same period of 1959; the corresponding figures for fuel oil production were 4·4 million and 3.9 million tons respectively.

This was stated in the Commons last week by the Minister of Power, who added that the Government were watching the question of imported fuel oil "very carefully." He thought that over the year as a whole production and consumption would roughly balance.

The Spectre of Inflation

BRITAIN might become "too much haunted with the spectre of inflation," Lord Chandos, chairman of AEI, told delegates at the annual meeting of the Society of Chemical Industry at Bristol last week. "We must not fall into the error of becoming so frightened of inflation that we strangle progress by not creating enough means of exchange to turn the ever-increasing number of ideas and inventions into saleable products for the rescue and help of a struggling world."

Lord Chandos wondered whether future economists would say that the comparatively slow rate of economic progress in 1960 was held back by a "bit of timidity" concerning the structure of credit.

He added: "It would be ironic if we created an economic system under which we would be struggling in our own wealth and in which, metaphorically speaking, the granaries of the world were bursting with wheat and more than half the world's population was starved for lack of it."

At the meeting Lord Chandos was presented with the society's Messel medal for outstanding service in public affairs and science.

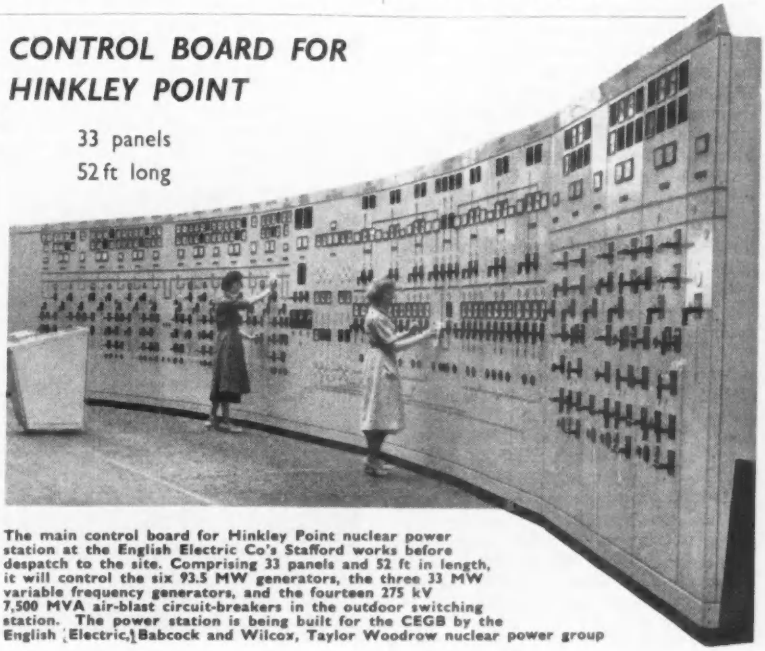
E.A.W. Photo Contest

A PHOTOGRAPHIC competition to find the best planned all-electric kitchen has been arranged by the Electrical Association for Women. First three cash prizes are £15, £10 and £5, and the winning entry will be reproduced in *The Electrical Age*. The competition is open to non-members, and details are available from EAW, 25 Fouberts Pl, W.1.

CONTROL BOARD FOR HINKLEY POINT

33 panels

52 ft long



The main control board for Hinkley Point nuclear power station at the English Electric Co's Stafford works before despatch to the site. Comprising 33 panels and 52 ft in length, it will control the six 93.5 MW generators, the three 33 MW variable frequency generators, and the fourteen 275 kV 7,500 MVA air-blast circuit-breakers in the outdoor switching station. The power station is being built for the CEGB by the English [Electric], Babcock and Wilcox, Taylor Woodrow nuclear power group

SHOWROOM DESIGN IN EIRE

NO modern tricks have been missed in the design of the Eire Electricity Supply Board's new offices and showrooms in Fleet St, Dublin, in which an older single-storey building has been skilfully integrated into the overall design so that little remains to identify old from new.

The four-storey building includes a 2,600 sq ft ground-floor showroom (pictured above), while office facilities on the upper floors have a total area of some 12,000 sq ft. Features of the design include large glass areas to the display and office floors, and aluminium curtain walling. The décor throughout is light green with perforated acoustic ceiling panels in cream.

Heating in the showroom is by (1,200 W) infra-red heaters built into special panels in the illuminated ceiling, while passers-by and window viewers are warmed by 3 kW infra-red heaters installed on the underside of the canopy projecting over the street in front of the display windows. Offices on all floors have off-peak electric floor-warming.

The showroom lighting consists of an extruded aluminium grid suspended below the structural ceiling and carrying 3 ft by 3 ft white plastic diffuser panels. The light sources are 40 W fluorescents. In the offices the level of illumination is 20 lumens/sq ft. The lighting system was designed by the board's Lighting Service Bureau in collaboration with the architect.

GPONIKS UNDER STUDY

THE possibilities of space communications for long-range telephone, teleprinter and television circuits routed via the moon, satellites or other space bodies are under close study by the Post Office and other organisations, the Assistant Postmaster-General stated in answer to a question in the House of Commons last week. But it was impossible at this stage to say whether such techniques would provide reliable or economical means of communication.

The Post Office, which in its 300 years of existence had always prided itself on being well ahead of other people, were maintaining close liaison with Jodrell Bank on this "very interesting scientific possibility" and were treating it "as a matter of urgency."

£½m Indian Order

AN order worth £½ million for rectifiers and transformers for Hindustan Aluminium Corporation has been awarded to English Electric. The equipment, to be shipped to a new plant in the spring of 1961, will supply direct current for aluminium smelting.

The main transformers consist of two 60 MVA 132/11 kV and two 56 MVA 11 kV regulating units. The six rectifier equipments each consist of a transformer and a group of air-cooled sealed steel tank mercury arc rectifiers, each group rated at 10,000 A 750 V d.c. Total load capacity is 45 MW. The order also includes control gear, d.c. switchgear and auxiliaries.

TV TOUR

SOME 58 members of the Ipswich and District Electrical Association were guests of Anglia TV recently when they toured the studios at Norwich and participated in a live telecast.

Register of Standards Associates

THE proposal to form a standards engineers' association, which was discussed at the joint BSI/IPE Conference on 11 May and reported in the ELECTRICAL TIMES on 19 May (p. 824), has received a large measure of support, nearly 250 replies to the questionnaire having been received by 9 July, the date set down for the preliminary meeting. Of this number about 70 expressed willingness to serve on committees and otherwise help in the formation activities.

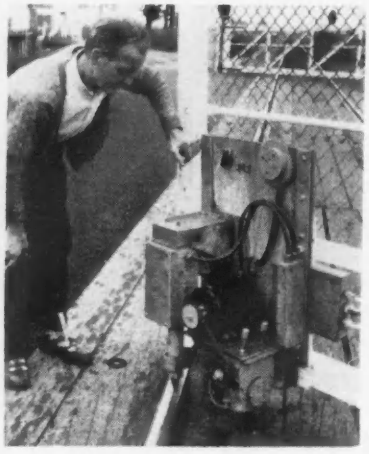
At British Standards House, London, the first meeting was accordingly held on Friday last, which was attended by nearly 150 standards engineers who had expressed their willingness to help. The meeting, under the chairmanship of Mr. H. A. R. Binney, director of the BSI, quickly got down to business and it was agreed to form a programming committee, which would be supported by the existing programmes committee of the joint BSI/IPE and would comprise six members from London, two each from the Midlands, N.W. England and Scotland and one each from S.W. England/Wales and N./N.E. England.

Nominations were then put up and an election to the 12 positions open on the committee held. There was only one nomination for Scotland, Mr. A. M. Lackie (Caterpillar Tractor), and he was returned unopposed, the second vacancy being left open for the committee to fill at a later date.

Prior to the election each of the members present who were willing to stand made themselves known to the meeting with a short verbal summary of their background and qualifications.

Members elected were as follows: H. B. Bowden (AC-Delco), C. S. Brewer (Geo. Kent), Dr M. A. Champney (De Havilland Props.), E. H. Williamson (Distillers), F. E. Butcher (Joseph Lucas), T. A. C. Sparling (Brush Electric), P. Coney (UKAEA), G. R. Gunning (Ruston Hornsby), P. H. C. Waddington (English Electric), G. A. Orton (Stewarts and Lloyds), F. L. Ogle (Consultant), R. H. Eastham (Textile Eng.).

After some discussion it was agreed that the name of the scheme should be the Register of Standards Engineers and that the members of the committee should be elected to serve for an initial period of two years. The annual subscription was fixed at one guinea.



A new method of opening and closing level crossing gates is being tested by the signal engineering department of British Railways North-Eastern Region at Bootham Junction, York. If successful, the system will greatly reduce installation and maintenance costs on crossing gates, which normally require ducts under the roadway, vulnerable to the pounding of heavy traffic. A small rubber-tyred wheel of motor scooter size is mounted on the toe of each gate and driven by an electric motor immediately above (see picture). At the touch of a switch in the signal cabin the wheels drive the gates either open or shut

Sears Roebuck in Britain

THE big American mail order concern, Sears Roebuck, has registered a private company, Sears Roebuck Ltd., in Britain with a nominal capital of £100 to carry on business as general merchants and buying and selling agents. It is understood that the move has been made to protect the name in the UK, and it is not as yet intended to set up commercial operations.

Questions on Coal Industry

ON 18 June the National Coal Board's undistributed stocks were just over 34 million tons of coal and about 5 million tons of coke, valued at £135 million, the Minister of Power (Mr Richard Wood) said in the House of Commons last week. The corresponding figure at the beginning of the year was slightly more than £140 million. The Board is reducing production and aiming at a steady reduction in the level of undistributed stocks over the next few years.

Mr Wood was answering MP's questions on various aspects of coal policy and financing. He declined to give an estimate of the Board's financial loss for the first half of 1960 in anticipation of the publication of the NCB's half-yearly statistical statement. An MP had suggested that the deficit by the end of this year would "undoubtedly be" £75 million.

Questioned about "decentralisation," Mr Wood reaffirmed that the Government had no plans to denationalise the coal industry or return to district wage agreements; meanwhile development plans were being discussed with the new chairman of the Board.

The rate of recruitment of labour in the coal industry (17,400 in the first 24 weeks of 1960) was a great deal higher than last year. It was estimated that between 587,000 and 626,000 men would be needed in 1965.

Coal only for Yorks power stations

THERE is no possibility of Yorkshire's two new power stations at Leeds and Doncaster being converted from coal to oil firing, Mr. W. H. Foster, representing the Yorkshire Division of the CEGB, told members of the Yorkshire Electricity Consultative Council last week. The stations are being built where ample supplies of coal are available and they are not designed to change over to oil.

A member of the council said that, as an engineer, he was not impressed by figures given in the secretary's report which showed an average thermal efficiency of about 30% at the 20 most efficient stations in the country.

"Coming into town this morning," he added, "I found there was a shadow over Rotherham from the cooling towers of the generating station. If it had been possible to use the waste heat for heating around the town, the actual efficiency would be nearly 80% rather than 30%. When electricity authorities are considering siting new stations, why do they not bring industry into the picture? There are many industrial concerns which use large quantities of steam for processing."

Mr Foster in reply said the Board always kept in mind the question of making use of waste heat from generating stations. Many things had to be considered when a new power station was being built and this was only one of them.

£4m for "Silver Trains"

AN order for 27 more "silver" trains at a cost of some £4 million has been placed by London Transport for complete replacement of existing rolling stock on the Uxbridge service of the Metropolitan Line. The 216 new cars involved will have unpainted aluminium bodies and fluorescent lighting. The contract will be carried out by Cravens Ltd.

Purchasing Conference

THE 1960 conference of the Purchasing Officers' Association will be held in Scarborough from 29 Sept. to 1 Oct. next, when the opening address will be given by Sir Edward Boyle, M.P., Financial Secretary to the Treasury. Details of the programme of papers to be presented are available from the secretary of the Association at 146a Queen Victoria St, E.C.4.

SIX AND SEVEN DIGEST

Not in the mood

The Six are not in the mood to negotiate at the present time, the President of the Board of Trade told three Parliamentary committees at the House of Commons last week. He was criticising critics who insist that Britain should enter the Common Market "come what may."

Joining the Six would mean the end of the Commonwealth system of trade, he warned. We should no longer be able to have our own trade agreements with Canada and Australia, for example—they would become European - Canadian and European - Australian agreements.

The other countries of the Seven had not carped about Britain's special trading arrangements with the Commonwealth, he pointed out, and it was difficult to see why the Six should not take the same view. While they refused to see Britain's point of view there was no climate in which negotiations could thrive.

Greece to join Six?

The Greek Government last week began talks with Italy and France with a view to becoming an associate member of the Common Market. Main obstacle is that the Six, while willing to grant Greece major facilities to protect her home industries, are reluctant to extend tariff exemptions to her agricultural exports.

Bridge that gap

The only way Britain could effect a bridge between the Six and the Seven was by giving way and agreeing to the terms of the Six, which would be "intolerable and unacceptable," Mr R. L. Wills, chairman of the overseas committee of the Association of British Chambers of Commerce, stated at the association's annual meeting in London last week.

He was moving a resolution, subsequently passed, approving attempts made by the Six and Seven groups to discuss ways of avoiding economic discrimination against each other.

"What must we do?" he asked. "We must make the best of what we have got, which is by no means inconsiderable. Our first task is to establish our loyalty to our new partners in the EFTA."

Mr Cyril Osborne, M.P., speaking for the Leicester Chamber of Commerce, said: "It is of vital importance that we, as traders, should do our utmost to strengthen the hands of the Seven. This resolution gives them notice that we are not going to 'rat'."

Seven meeting off

The Ministerial meeting of the European Free Trade Association which was to take place in Berne this month has been postponed. There are at present "no points of sufficient importance to warrant the meeting," an EFTA spokesman said. The meeting will now probably take place in September in Geneva or Berne.

P.M. on trade threat

The Government endorses the view, expressed by the President of the Board of Trade in the USA recently, that the present economic division of Europe was a grave threat to the normal development of European trade, including our own, even though this was not the design or intention of the Common Market countries.

This was stressed by the Prime Minister in the Commons last week in answer to MP's questions on Six and Seven trading problems.

Mr Macmillan reiterated the need for partnership between the two groups for a common system of European trade. While he was sure that the Seven would prove successful in its own right, he still believed that in both short term and long term "we ought to try every means to bring about harmony."

Henley Prize Fund

A PRIZE fund to be known as the "William Thomas Henley Prize Fund" has been instituted by the governing body of Gravesend Technical College to commemorate the long association in the past between W. T. Henley's Telegraph Works Co. (now part of AEI group) and the college. Two prizes will be awarded annually by the Principal to students undertaking part-time study courses at the college.

I.M.E. Symposia

A SERIES of six symposia, arranged by the Institution of Mechanical Engineers, is to take place between September and March next in addition to the Institution's usual programme of meetings. Subjects are:

27-28 Sept.—Automatic Control (29 papers).
9-10 Nov.—Use of Secondary Surfaces for Heat Transfer with Clean Gases (12 papers).
7 Dec.—The Dounreay Fast Reactor (6 papers).
18 Jan.—Pressure Vessel Research towards Better Design (12 papers).
1 Mar.—User Experience of Large Scale Industrial Vacuum Plant (6 papers).
8 Mar.—Mechanics of Combustion Deposit Formation and Adhesion (4 or 5 papers).

The last four dates are provisional. Further details to be announced.

Sayings OF THE WEEK

"It is fruitless to exhort a trader to export as a form of self-sacrifice for some distant cause. It is necessary to show him he can do overseas business at a profit." . . . SIR FRANK BOWER, president, addressing Association of Chambers of Commerce.

"If the telephone industry can make satellite systems work, as we believe they can, they will help us increase the number of intercontinental voiceways many times over." . . . F. R. KAPPEL, president, American Telephone and Telegraph Co.

"There is nothing equivalent in the Western world to the scale of fundamental welding research [in USSR]." . . . R. L. SWAN, deputy leader, British welding delegation.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, July 12

	£ per ton	Weekly change £
COPPER, standard class A (settlement) ...	260½	+6½
" (3 months)	251½	+7½
LEAD, refined pig, 99·97% purity (cash)	71½	−¼
" (3 months)	72¼	−¼
TIN, refined, min. 99·75% purity (settlement)	806	−3
(3 months)	802	−3½
ALUMINIUM, ingots 99·99·5% ...	186	—
" wire bars (4×4×54")	193½	—
BRASS Strip 63/37	225	+4½
SILVER (Troy oz)	79½d	—

	£ per ton	Weekly change £
ZINC, virgin, min. 98% purity (cash)	90½	+½
" (3 months)...	90¾	+½
RUBBER, per lb.		
No. 1, R.S.S. spot	31⅜d	−3d
c.i.f. basis, ports, Sept.... ...	31⅛d	−1⅛d
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	66½	—
Mild Steel Tape (0·04 × 1⅛ in.)	53*	—
NICKEL (home)	600	—
MERCURY (76 lb flask)	70½	—
AMERICAN PRICES:		
Copper, electrolytic (per lb) ...	33c	—
Lead (New York)	12c	—

* *Tape Price, now an average, includes varnishing*

"Fluke" electrocution in "disgraceful" workshop

A FAULTY inspection lamp was responsible for the electrocution in "fluke" circumstances of a vehicle body builder employed in the engineer's department of Coventry Corporation, it was stated at the Coventry inquest last week on Frederick J. B. Brown (57), who was found dead in a Corporation carpenter's shop.

An East Midlands Electricity Board engineer said that tests revealed that the metal cage over the bulb on the inspection lamp was live. His theory was that the lamp had been dropped and the bulb had broken, but by a "pure fluke" the filament maintained continuity to one of the prongs in the bulb, and the current "flipped" across to the metal cage so that Brown was electrocuted when he handled the lamp.

It was also stated that the wire in two fuses in the circuit was twice as thick as it should have been, but even so earth resistance to the socket into which the lamp was plugged was high. There was also an intermittent fault in the switch on the socket, but that had no bearing on the death.

Reference to the "digraceful" state of the carpenter's shop was made by the deputy superintendent of vehicle and plant maintenance in the engineer's department. "Conditions were very bad," he said. "It is a complete disgrace, in my opinion, to expect men to work in them."

The maintenance of the building had been allowed to "run down," he added, because a new garage was being built and was nearly finished. There was a 12 V system in the building for use with inspection lamps. He did not know where the lamp Mr Brown was using came from; he thought that all lamps of that type had been withdrawn some time ago.

Orders for Crane Motors

CONTRACTS worth £317,000 have been obtained by the Motor and Control Gear Division of AEI for more than 200 direct current motors to be used for driving heavy duty cranes in steel works. The cranes, ranging in capacity from 15 to 200 tons, will be installed at the new Spencer Works near Newport, Mon, of Richard Thomas and Baldwins Ltd, for handling material in a new strip mill.

News in Brief

Ward and Goldstone are to supply wiring for the Falcon compact car to be made by Ford Motor, of Detroit.

Mr R. F. Marshall, manager, Education Department, AEI (Manchester) Ltd., spoke of AEI's 6,400 apprentices during his address at the Apprentice Association's parents' day at the Willesden Works of the Switchgear Division on 2 July. He subsequently presented essay competition prizes.

Production of Monogram automatic electric blankets at the Crawley factory, to which we referred on 30 June, will be several thousand a week—not 4,000 a month as we stated.

A 14-storey block of flats to be built in Basildon town centre will have electric underfloor-warming and two lifts.

Presentations were recently made to 44 employees of the Phoenix Telephone and Electric Works Ltd. and associated companies, each of whom had completed 25 or more years' service.

First of two 180 MVA 275/132 kV auto-transformers manufactured by Fuller Electric Ltd. (a member of the Hawker Siddeley Group) leaving the works on its way to the CEGB supergrid substation at Canterbury, Kent. The transformer delivered, with its 11 ft high bushings, stands 25 ft 6 in. in height and its installed weight, including oil and coolers, is 263 tons

Company Activities

PYE LTD. have certainly upset the telephone market apple-cart with its share-swap offer to Telephone Manufacturing Co. On the basis of four 5s Ordinary shares in Pye for every five 5s Ordinary shares in "Temco" the bid is currently worth around 13s 8d a share for Temco shareholders which goes against 4s 10d earlier this year, a counter-bid of 12s 6d cash a share from the seven-strong consortium and a present price in the market for Temco shares of 15s 3d each.

There can be adduced good reasons at this level for Temco shareholders to sell out onto the market on the principle of a bird-in-the-hand. Pye's chairman, Mr C. O. Stanley wants to break into the circuit, The Telecommunication Engineering and Manufacturing Association, comprising AEI, GEC, Automatic Telephone and Electric Co., Ericsson Telephones, Marconi Wireless Telegraph Co., the Plessey Co., Standard Telephones and Cables—and Telephone Manufacturing—which between them supply all the GPO's telephone equipment. But Mr Stanley who is already in the radio-telephones business, putting the payroll bandits out of business, can have no doubt that he will be playing an unsuccessful David if the Goliath he faces decides to get tough. There is precious little telephone business for the Seven as it is and the entry of an efficient newcomer could only be expected to rouse opposition. Mr Stanley's means are limited and against cash of £372,000 in the last balance sheet there was an overdraft of £3·8 million. Money would appear to be no object to the counter-bidding consortium so that anything Mr Stanley did in the way of offers, the Seven could do better. But there is just one very real snag here. Public attention, indeed the attention of the House of Commons, is now focused on an attempt which could develop into the very negation of free enterprise and there is, additionally, always a widespread sentiment which deplores big boys treading on little boys. Moreover, Lord Chandos, as chairman of AEI, who has always been an outspoken advocate of business enterprise must view any possibility of a run of bid counter-capping, in order to preserve a monopolistic status quo, as something not far short of an embarrassment. For these reasons Mr Stanley's first bid may yet succeed. If it did, in terms of Pye takeover shares it would mean 1s 7d a share less than the price realisable on Temco shares in the market.

Elsewhere in the electrical share market last week there was no lack of good company news including E. K. Cole, Wilkins and Mitchell, Dubilier Condenser but found very little reflection in share values. Associated - Rediffusion were unchanged despite the fact that they topped the list with their commercial TV earnings for the half year January-June, 1960. Gross Revenue for the half year was just over £8 million—30% up on the corresponding period of 1959. The 5s "A" Deferred shares of The British Electric Traction Co. which owns a 50% interest in Associated-Rediffusion were similarly unaffected at 46s as were the 5s Ordinary shares of Rediffusion at 37s 9d with its 37½% holding in A-R. Granada reported earnings 40% higher at £7·45 million but this time shares went 1s better to 113s 3d and over the week were a few coppers better helped by the news that Bushnell Television, in which Granada is one of the chief shareholders, had been awarded the franchise for the independent television station in Ottawa so giving Granada its first opening in Canadian TV operations.

Perhaps Pye, which already has a "substantial investment" in Associated Television, which takes third place among the TV earners with an 18% rise to a half-year £7·16 million, ought to do something more about this.—*From our City Correspondent.*

E. K. Cole Ltd.

The first eight or nine months of the past year produced an enormous demand for television, but at the end of November the position deteriorated rapidly and, by the end of January, manufacturers and dealers were left with exceptionally heavy stocks, which, even today, have not been entirely liquidated, Mr E. K. Cole, the chairman, states. But he is hopeful that this autumn will show a recovery to a more or less normal market demand. The subsidiary, Egen Electric Ltd., achieved new records in turnover and profit for the year and Ekco Electronics Ltd. had a satisfactory year with 50% of the turnover being exported. The heating equipment section of the business continues to grow and Mr Cole anticipates steady progress in that sphere. Although competition continues to be acute, turnover in export markets shows an increase over last year. In some territories, orders can be secured only at prices which are not completely economic; the need for successful home market trading to support such export activities is, therefore, essential, he adds. On the general outlook he considers the long-term prospects are still good, with several of the company's other activities making good progress.

Dubilier Condenser Co. (1925)

With the profit, etc., for the year to 31 March increasing to £281,837 (*£229,007*), the dividend is raised by 5% to 30%. It is also proposed to capitalise £323,269 in a one-for-one scrip issue.

Electric Construction Co. Ltd.

The year ended 31 March last saw a restriction in the home sales demand for capital goods which has led to even more severe competition, Mr C. Reid, the chairman, reports. The company was unable to obtain a sufficient volume of business to offset completely the lower profit margins despite further improvement in overall production efficiency. But since the end of March there has been a decided improvement in the order book and there is every indication that this will continue in line with the developing demand for capital goods, he adds. Among the associated and subsidiary companies, the launching of ECC (Moulded Breakers) Ltd. has involved much capital and development expenditure, but the directors are confident of the ultimate success of the venture which should contribute appreciably to the company's profit as sales and production get into full swing. In Australia, a shareholding has been purchased in McColl Electric Works and that concern has been granted a licence to manufacture and sell ECC products in that growing market. A considerable volume of orders has already been received for major telecommunications equipment, which is now being manufactured partly at Wolverhampton and partly in Australia.

Year to 31 Mar.	£ Trading Profit	£ Net Profit	% on Ord.		Ord. Price	
			Earned	Paid	High	Low
1956	553,156	85,011	15	8½	29/9	21/-
1957	610,028	94,209	17	8½	27/9	21/10
1958	346,181	106,934	19	8½	29/6	20/3
1959	346,778	118,539	20	9	37/3	27/9
1960	312,863	197,526	16	9	43/6	35/9

Ferranti Ltd.

Group sales input for the past year was a record, in which most sections shared. Of the record output of power transformers and associated equipment 45% was exported. In the electricity meter business prices have declined considerably in both home and overseas markets and the pressure for further reductions continues, Sir Vincent de Ferranti, the chairman, reports. Being the largest single manufacturer of such meters in Gt. Britain has assisted the company in meeting the decline so far by reducing production costs. Orders for other types of instruments increased

Year to 31 Mar.	£ Trading Profit	£ Net Profit	% on Ord.	
			Earned	Paid
1956	1,836,787	626,366	98	6
1957	1,121,034	72,822	1	6
1958	1,894,152	575,971	89	6
1959	3,116,564	1,104,572	84	6*
1960	4,014,890	2,123,390	166	6

* Plus 150% capital bonus.

during the year, among the developments being apparatus for detecting and locating transient faults on h.v. transmission lines. The extensive programme and development is particularly yielding returns in the semiconductor devices field, and a new wing has been added to the Wythenshawe laboratories to provide further room for that work. In Australia, a substantial interest has been acquired in the Wilson Electric Transformer Co. Pty. and their factory at Melbourne has been extended to deal with power transformers of the larger sizes. In the USA, Ferranti Electric Inc. has had another successful year's trading and is expanding its manufacturing facilities.

Hick Hargreaves and Co.

The final dividend is raised 2% to 14% making a total of 18% (16%) for the year ended 31 March last. Consolidated profit for the period, after all charges, amounts to £397,903 (*£329,305*).

Permali Ltd.

In view of the improved earnings of the parent and UK subsidiaries in the home market, progress achieved in North America, and the healthy state of the order books, the directors anticipate a successful trading result this year.

Pye Ltd.

For the year to 31 March last, group profit expanded to £2,423,884 from the figure of £1,885,423 of the previous period. After tax, etc., net profit is £1,386,940 (*£900,957*). Ordinary dividend is 15% on capital increased by a one-for-ten scrip issue, against 12½% on the old capital last time.

Pyrotenax Ltd.

Although conditions were strongly competitive, the high level of trading activity which was maintained throughout the year resulted in an increase in volume and sales value over the previous year's figures. In the further development of the range of products for wider application in industry an additional factory site and premises have been purchased in Hebburn, to where some of the special cable production and development work will be transferred.

Year to 31 Mar.	£ Trading Profit	£ Net Profit	% on Ord.		Ord. Price	
			Earned	Paid	High	Low
1958	733,022	309,856	69	40*	38/6	27/3
1959	818,253	372,610	79	34	48/-	33/10
1960	906,657	419,611	88	40	56/6	44/9

* Plus 50% capital bonus.

Sir Brograve Beauchamp, the chairman, regards the future outlook with confidence, particularly in view of the extension of overseas business. In Canada, for instance, the local company had a year of steady progress with sales and profits in excess of the previous period, and prospects for the current year are encouraging. In Australia standard 660 V and 440 V cable is being produced at the Melbourne factory, which, over the next two years, it is proposed to make into a self-contained unit for complete processing of finished cables from raw materials purchased locally, wherever it proves economic and/or convenient to do so.

Ruston and Hornsby Ltd.

For the year ended 31 March last the trading profit amounted to £1,366,811 compared with £1,500,633 for the previous period. But the profit on contracts completed in earlier years and investment income is higher for the year, while the taxation charge drops to £361,227 (*£403,070*). Net profit is £625,708 (*£577,875*) and dividend is raised 1% to 9%, thus restoring the cut made a year ago.

James Scott and Co. (Electrical Engineers) Ltd.

Certain activities have so developed that the changing of James Scott into a holding company with the title James Scott (Electrical Holdings) is planned. The Electronics Division is growing rapidly as a unit. Mr I. Sclar, the chairman, reports that orders for all the group at the beginning of the year compared favourably with last year and the intake of orders since January is much greater than for the previous like period.

Wilkins and Mitchell Ltd.

A big jump in the group profit for the year to 31 March last is reported. The total is £1,087,108 compared with £619,254 in the previous period, both before tax. The dividend is raised from the equivalent of 13·6% to 21% for the year. After tax, etc., net profit is £551,298 (*£323,746*). The directors state that sales in the domestic appliance division have fallen substantially as a result of the hire purchase restrictions imposed in April, and production has had to be cut accordingly. The machine tool division remains busy with a full order book.

Company Meeting

B. S. AND W. WHITELEY, LIMITED

RECORD DELIVERIES

MR. WILLIAM WHITELEY'S STATEMENT

THE annual general meeting of B. S. and W. Whiteley Limited was held on 6 July at Torracks Hill, Poole-in-Wharfedale, Yorkshire, MR. WILLIAM WHITELEY, J.P. (chairman and managing director), presiding.

The following is his circulated statement:

In presenting the accounts for the year ended 31 March, 1960, it is once again a pleasure and a privilege to be able to report progress. The deliveries during the year under review were the highest on record both in tonnage and in value.

Rising costs of manufacture have been held in check wherever possible by more economical working and offset to some extent by the increased sales. It is hoped to maintain selling prices as at today although a further wage increase was accepted by the industry at the beginning of April.

A pleasing feature of the sales is an increase over last year in the export of "Elephantide" by an amount of over 25 per cent. Eleven of the fourteen larger countries to which we export have increased their purchases, the three taking less being very small importers of insulating materials.

In addition to the capital commitments referred to in the Balance Sheet it is anticipated that further expenditure will be incurred during the year in improvements to production with the object of still further increasing the production of existing plant and further endeavouring to economise in production costs. The available cash resources of the Company should be sufficient to meet this development.

The Outlook

For the two months since 31 March trading has been on a slightly higher level than the corresponding period last year and the order book as at present should maintain this increase, although we are not immune from Government interference with normal trading.

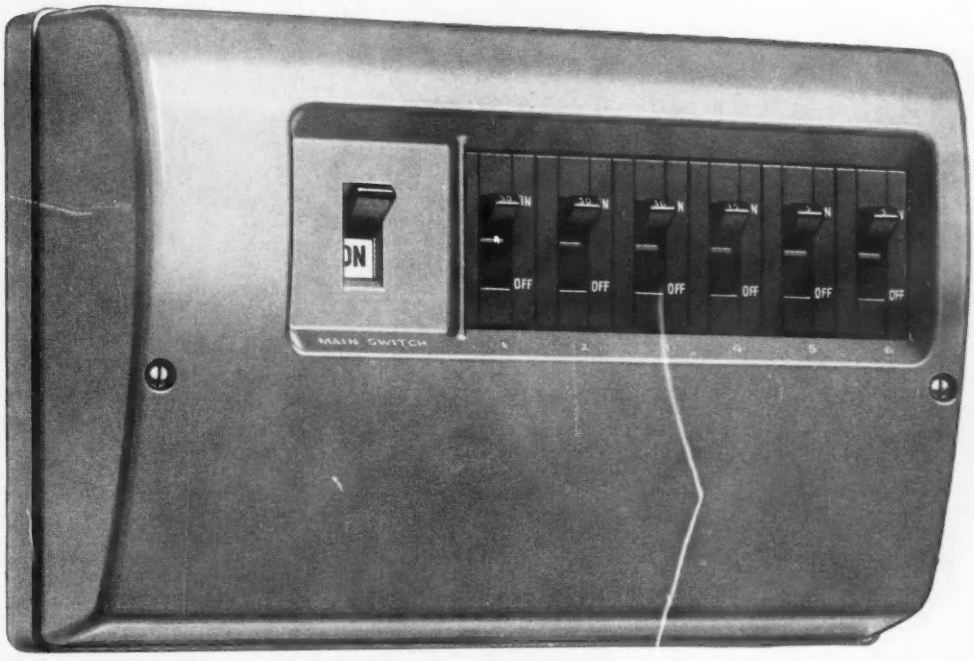
It used to be the fashion to describe persons who were having little difficulties with uncertainties as being "at SIXES and and SEVENS" and now that the Government have become involved in the SIXES and the SEVENS difficulties, it would be a superhuman mind that could judge the effect of the final action which the Government will decide on. We are of course mainly dependent on a healthy British Electrical Manufacturing Industry and we shall at least hope that nothing will be finalised by the Government which will impair the prospects.

I would just like to make reference to the Extraordinary General Meeting timed to follow the Annual Meeting. One effect of doubling the authorised Capital during last year was to double the borrowing powers of the Directors under Article 87 of the Articles of Association as at present in force. When this was pointed out your Board, without hesitation, agreed to amend the Articles and now propose a substituted Article 87 which, in effect, limits the amount to that existing before the recent capital increase and is in line with modern practice.

Once again tribute is paid to the loyalty of our Staff and Workpeople and we move along through another year with every confidence.

The report and accounts were adopted; a final dividend of 15 per cent., less tax, making 25 per cent. on the Ordinary Shares for the year, was approved, and the retiring director, Mr. Holmes Whiteley, was re-elected.

At the subsequent extraordinary general meeting the proposed alteration to the Company's Articles of Association was duly sanctioned.



Another dramatic Crabtree 'first'

- Built-in inverse current/time delay device prevents harmless transient overloads causing nuisance tripping.
- Instantaneous tripping under heavy overload or short-circuit fault conditions.
- Magnetic-hydraulic tripping ensures close and accurate protection against any form of sustained overloading.
- Neither minimum tripping current nor nominal current rating are affected by variations in ambient temperature.
- All ratings will maintain their accurate tripping characteristic after repeatedly clearing overload or short-circuit faults.
- In addition to the all-insulated consumer's unit a wide range of sheet-metal enclosures for both industrial and domestic installations will be available.

Further technical information is available on request

For the first time an all-insulated consumer's unit embodying circuit-breaker protection will soon be available for the domestic installation

This unique Crabtree Consumer's Unit is designed to bring to the domestic user all the advantages of an entirely new miniature circuit breaker—the Crabtree Type C-50.

Although designed to give all the advantages of miniature circuit-breaker protection at a domestic installation price, the Type C-50 provides the user with short-circuit and overload protection to a standard of reliability unrivalled even by units of a much higher price.

A series of rigorous proving tests have shown that the Type C-50 circuit breaker may confidently be recommended for dealing with any fault conditions likely to arise on any domestic or other normal installation.

CRABTREE

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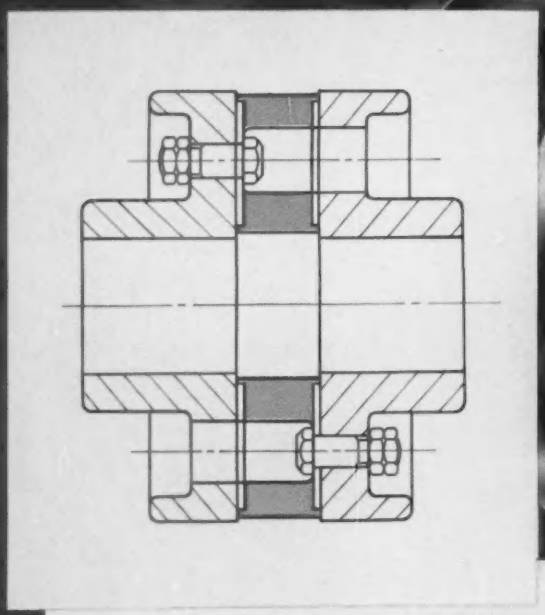
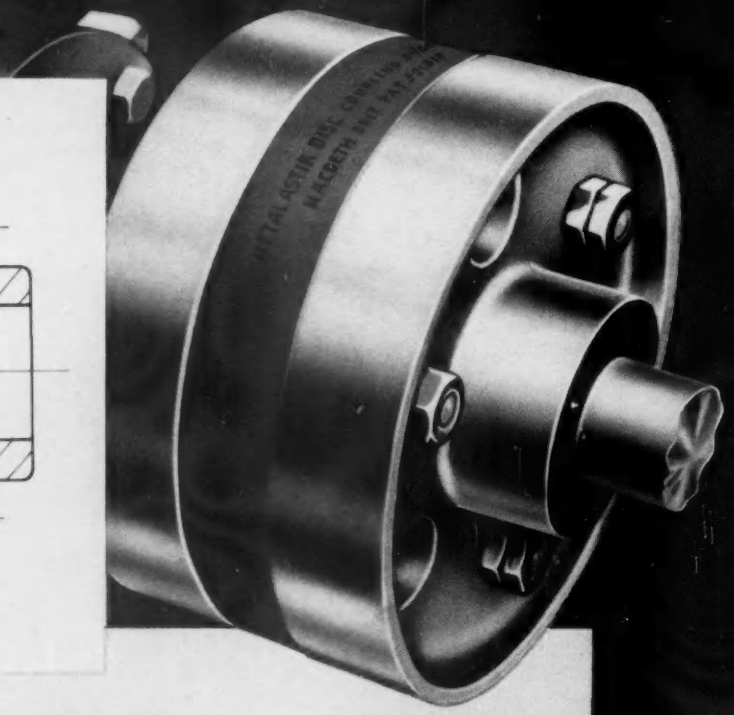
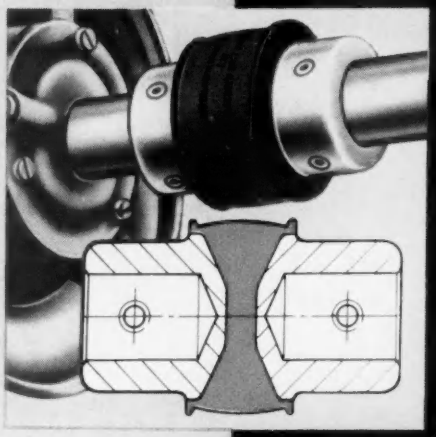
J. A. CRABTREE & CO. LTD., LINCOLN WORKS, WALSALL



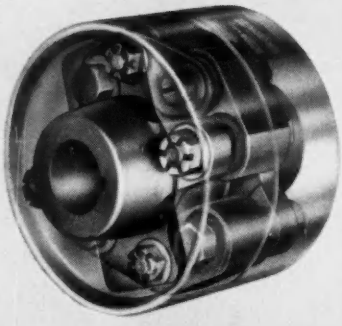


MISALIGNMENT TORSIONAL VIBRATION TORQUE FLUCTUATION



According to application Metalastik flexible couplings allow for angular or parallel misalignment or the two combined. Axial travel is accommodated by some couplings, or when required, axial thrust can be transmitted with insignificant deflection. Still other couplings accentuate torsional vibration damping or the capacity to smooth out fluctuating torques. Over twelve different types of coupling enable us to provide the most suitable unit for an extremely wide range of applications.

Disc couplings, top of page, allow for angular and parallel misalignment, end-float, and absorb large irregularities in power transmission. In sizes to transmit 0·8 to 96 h.p. per 100 r.p.m. they can be fitted without interfering with machinery setting.



Barrel Couplings (centre) combine great torsional flexibility with the capacity to accommodate parallel and angular misalignment. In sizes for drives of 0·005 to 0·54 h.p. per 100 r.p.m. they are ideal for connecting motors to light machines.

The ghost view shows the Metalastik Trailing Link coupling which permits exceptional parallel misalignment and is available in sizes to transmit 1 to 20 h.p. per 100 r.p.m.

Our engineers are at your service.

METALASTIK

METALASTIK LTD., LEICESTER

M 285

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

14 July—Beverley R.D.C. Contract Two. Supply and erection of three 300 cubic ft per min. unscreened sewage pumps complete with motors, starters and accessories. —See 30 June issue.

14 July—Sunderland C.B. Electrical installations: in 138 dwellings; in Plains Farm Junior School for water heating services; in Bede Grammar School's kitchen/dining room block.—See 30 June issue.

14 July—Sunderland T.C. Electrical installation in £16,000 community centre at Monkwearmouth.—See 23 June issue.

15 July—Blackpool C.B. Relighting of Waterloo Rd school. Director of Lighting and Electrical Services, Rigby Rd East.

15 July—Callander T.C. Supply, erection and putting into service of 10 steel columns with 140 W sodium lanterns and auxiliary equipment for A81 lighting.—See 23 June issue.

15 July—Croydon C.B. Electrical installation in Whitehorse Manor School, Whitehorse Rd.—See 30 June issue.

15 July—Kesteven C.C. Supply and erection of 15 steel lighting columns at A1 Gonerby Moor roundabout.—See 30 June issue.

15 July—Renfrew C.C. Electrical installation in Howwood Primary School replacement. Applications to County Clerk, R. Urquhart, County Bldgs, Paisley, by above date.

16 July—Eccles B.C. (a) Supply and erection of 30 25 ft concrete columns and installation of (item b) equipment; (b) supply of 30 140 W sodium lanterns and ancillary electrical equipment. Borough Engineer and Surveyor's Dept., Town Hall. Deposit £3 3s.

16 July—Rayleigh U.D.C. Supply and erection of 74 Group "B" concrete columns with metal filament lamps, etc.—See 7 July issue.

18 July—Irwell Valley Water Board. Supply and erection of automatic electric pumping plant, Whitefield, to deal with constant 2 m.g.d. flow.—See 2 June issue.

18 July—Montgomeryshire C.C. Electrical installations in school and canteen, headmaster's house, caretaker's house and Scott Villa at Aberhafesp. Director of Education, J. A. Davies, Education Offices, Newtown.

18 July—Morley B.C. Supply, installation and putting into service of 36 totally enclosed 140 W sodium street lighting units on 25 ft concrete columns.—Advertised 30 June issue.

18 July—Mountain Ash U.D.C. Supply and erection of 55 35 ft steel columns and 200 W sodium units together with underground cable works and wiring. Engineer and Surveyor, W. F. Greenway, Town Hall. Deposit £2 2s.

18 July—Rochester C.C. (3) Installation, on fixed-price basis of new heating and lighting systems in Corn Exchange improvement scheme. Applications to J. A. Peel, City Surveyor, 66 Maidstone Rd.

18 July—Scalby U.D.C. (a) Supply and erection of 34 colour corrected m.v. 125 W lamps and 11 80 W for Group "B" lighting; (b) supply of lanterns, time switches, lamps and ancillary equipment; (c) supply, erection and painting of 15 and 18 ft steel columns complete with brackets; (d) installation and wiring; (e) equipment, for Coldyhill Lane, Newlands Pk Drive, Cleveland Ave and Weydale Ave. Newby lighting. —See 30 June issue.

18 July—Sedgley U.D.C. Installation of 91 Group "B" 80 W mercury lamps on 15 ft concrete columns previously purchased. Engineer and Surveyor, The Limes, Dudley Rd. Deposit £2 2s.

20 July—East Kesteven R.D.C. Electrical modernisation in 22 aged persons bungalows. Architect, 14 Northgate, Sleaford.

20 July—Havant and Waterloo U.D.C. Power installations in 356 pre-war houses divided into groups of 28, 25, 24, 117, 56, 58 and 48 houses. Engineer and Surveyor, 1 Park Rd North, Havant.

20 July—Swansea C.B. Electrical installation included in improvements at Hendre Fawr Hse, Garnswllt, Ammanford.—See 7 July issue.

20 July—Wigan C.B. Wiring installations in 13 dwellings on Worsley Mesnes housing estate. Borough Engineer, Municipal Bldgs, Hewlett St. Deposit £1 1s.

21 July—N.I. Hsg. Trust. Electrical installations in 108 dwellings at Banbridge.—See 7 July issue.

21 July—Northumberland C.C. Electrical installation at Berwick Grammar School. Applications to County Architect, 30-32 Gt. North Rd, Newcastle-on-Tyne 1, by above date.

22 July—Mildenhall R.D.C. Contract 2. Supply and erection of two each of 450, 600 and 125 g.p.m. crude screened sewage pumps and two 100 g.p.m. sludge and supernatant water pumps, all complete with motors, starters and accessories.—See 7 July issue.

22 July—Reading C.B. Supply and installation of cables, switchgear, fittings and accessories for distribution, control and site lighting for new Manor Farm Sewage Disposal Works, which is under construction. —See 9 June issue.

22 July—Twickenham B.C. Supply of: (a) reinforced concrete and (b) steel columns and brackets; (c) supply and erection of lanterns/control gear and erection of columns/brackets for 600 sodium and 3 x 80 fluorescent lighting units, being Stage IV of street lighting improvements—See 7 July issue.

23 July—N.I. Hospitals Authority. (c) Electrical engineering services at new two-storey 65-bed ward unit at Musgrave Pk Hospital. Applications to Secretary, N.I. Hospitals Authority, 27 Adelaide St, Belfast, by above date.

25 July—E.B. for N. Ireland. Supply and erection of power, control and indication cables for boiler/turbo-generator No. 3 at Coolkeeragh Power Station.—See 7 July issue.

25 July—Epsom and Ewell B.C. Erection of 203 25 ft columns with fixing/wiring of 140 W sodium lanterns and gear. Borough Engineer and Surveyor, C. Cobbett, Town Hall, Epsom. Deposit £2 2s.

25 July—Forehoe and Henstead R.D.C. (c) Electrical installation in Central Depot, Ketteringham.—See 23 June issue.

25 July—Londonderry. Supply of (Item 15) electrical materials for six months from 1 Oct., 1960.—See 7 July issue.

25 July—Manchester C.C. Electrical installations in 65 houses and flats at Maple Rd, Brooklands, contract 317. Director of Housing, Town Hall, Manchester 2.—Advertised in this issue.

25 July—Manchester C.C. Electrical installation in Victoria Pk Secondary School. City Architect, P.O. Box 488, Town Hall.

25 July—Wanstead and Woodford B.C. Provision and erection of colour corrected mercury street lighting in Snakes La East (Group "A"), Snakes La West (Group "B") and The Broadway (Group "B").—Advertised 7 July issue.

26 July—Ilford B.C. (a) Erection and connection of 1,000 columns; (b) cable laying, jointing and trenching; (c) thrust boring for Stage III of Group "B" street lighting. —Advertised 23 June issue.

27 July—Penybont R.D.C. Provision and erection of 72 100 W tungsten lamps on 15 ft columns on nine sites.—See 7 July issue.

28 July—Cuckfield U.D.C. Erection of 23 octagonal steel lighting columns, fixing and wiring of 23 3/80 W fluorescent lanterns complete with control gear. Surveyor, Council Offices, Oaklands, Haywards Heath. Deposit £1 1s.

28 July—Droitwich B.C. Supply and erection of 55 30 ft steel columns with 200 W sodium lamps/lanterns/gear and wiring plus the dismantling of 55 existing points. Borough Engineer and Surveyor, Town Hall. Deposit £2 2s.—Advertised in this issue.

28 July—Omagh. Electrical installation in new Crown Bldg, Mountjoy Rd, for M. of Finance.—See 30 June issue.

29 July—Aberdeen Harbour Commissioners. Supply of, item 11, electrical fittings for year from 1 Oct., 1960. General Manager and Secretary, N. R. Beattie, 16 Regent Quay.

29 July—Brighton C.B. Supply, erection and maintenance of three electrically driven submersible well pumps and four booster pumps with control gear, etc.—See 16 June issue.

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 107 queries answered this week

"Latralok" fuse carriers—address for? S.E.E.B.—Dexray Engineering Co. Ltd., 34 Ardwick Green South, Manchester 13.

"Mall-Saw" electric saws—agents for? F.F.—Gaston E. Marbaix Ltd., Devonshire Hse, Vicarage Cres, S.W.11.

"Beehive" space heaters—makers of? I.F.—K.L.B. Electric Ltd., 16 Heneage La, E.C.3.

"Vanguard" fluorescent fittings—makers of? E.E.W.—Vanguard Engineering Co., 197 Lee High Rd, S.E.13.

Fused magnesia for embedded heating elements—makers of? A.C.F.—The Thermal Syndicate Ltd., P.O. Box No. 6, Wallsend, Northumberland.

"Duratax" food mixers—makers of? L.E.B.—John Hunt (Bolton) Ltd., Alma Wks, Ramsbottom St, Derby St, Bolton, Lancs.

"Legg" battery chargers—makers of? T.E.—Legg Industries Ltd., Williamson St, Wolverhampton, Staffs.

"Raysol" health lamps—makers of? L.E.B.—Raysol Electrical Co., 550 Holloway Rd, N.7.

"Aumann" coil winding machines—agents for? G.T.—R. H. Cole (O'seas) Ltd., 2 Caxton St, S.W.1.

30 July—Bridport B.C. Supply and erection of 26 Stewarts and Lloyds tubular steel fluted columns and 125 W m.v. lamps for Group "B" lighting at North Allington.—See 30 June issue.

30 July—Harlow U.D.C. Erection of 89 Group "B" columns, four Group "A" columns, fixing of 24 wall brackets, fitting/wiring of lanterns/control gear together with ancillary works. Engineer and Surveyor, A. W. R. Webb, Town Hall. Deposit £2 2s.

10 Aug.—Surbiton B.C. Installation of 193 sodium and 270 colour-corrected mercury Group "A" lighting points. Engineer and Surveyor, R. Thirlway, Council Offices, Ewell Rd.

10 Aug.—Wortley R.D.C. Installation, complete, of colour-corrected mercury lighting: scheme 54, Ecclesfield bus route, 67 125 W on 20 ft columns; scheme 55, Stannington bus route, 60 80 W on 15 ft columns; scheme 57, Chapeltown to High Green, 74 125 W on 20 ft columns; scheme 58 (part) Chapeltown 29 250 W on 25 ft columns. Engineer and Surveyor, A. Wikeley, Council Offices, Grenoside near Sheffield.

12 Aug.—Larne B.C. Electrical installations in: (a) shops and flats at Antiville; (b) 7/4 scheme of 50 dwellings; (c) 75 scheme for 52 dwellings.—See 7 July issue.

16 Aug.—Islington B.C. Design, provision and installation of floodlighting at Market Rd playground. Borough Engineer and Surveyor, Town Hall, Upper St, N.1.—Advertised in this issue.

18 Aug.—Cookstown. Electrical installation in hostel and extension at Loughry Agricultural for M. of Finance. Room 103, Law Courts Bldg, Belfast 1.

24 Aug.—Bridge-Blean R.D.C. Supply of duplicate 75 g.p.m. against a 105 ft head vertical spindle direct coupled centrifugal sewage pumps for Tyler Hill scheme. Engineer and Surveyor, P. J. Thackeray, 41 Old Dover Rd, Canterbury, Kent.

3 Sept.—Cambridge C.C. Supply of item (d) lamps. Applications marked "Application for Tender Documents to City Engineer and Surveyor, The Guildhall.

No date stated—Berks C.C. Supply and erection of 28 35 ft steel columns, lanterns and other work for Oxford Southern and Western By-pass scheme, Botley and Woodstock Rd roundabouts.—Advertised 30 June issue.

No date stated—Fishguard and Goodwick U.D.C. Provision, erection and wiring of 19 140 W sodium lanterns on 25 ft steel columns and 33 brackets on existing wooden poles for A40 street lighting.—See 23 June issue.

No date stated—Southampton C.B. Electrical and mechanical work in (a) electrical machines laboratory and (b) steam engines laboratory at College of Technology. Inquiries, with details of previous similar work, to Chief Education Officer (Ref. 57/66), Education Dept., Civic Centre.—Advertised in this issue.

No date stated—S. Warwickshire Hospital Group. Applications for inclusion in approved list of electrical contractors to Superintendent Engineer, 50 Holly Walk, Leamington Spa.

No date stated—Taf Fecham Water Supply Board. Conversion to a.c. of treatment works at Pontsticill, near Merthyr Tydfil.—Advertised 16 June issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

19 July—Greece. 16 items of lighting equipment. Hellenic State Railways, Purchases and Stores Dept, 12b Polytechniou St, Athens. B.o.T. (ESB/17313/60).*

20 July—India. Six items time switches from 15 to 50 A in quantities of 100, 150 and 200. Superintending Engr, Technical/Electrical, Andhra Pradesh State Electricity Board, 10-2-3 A.C. Guards, Hyderabad. B.o.T. (ESB/17343/60).*

20 July—Burma. Bulbs, five items, from 15 to 200 W in quantities of 1,500 to 30,000. Cables and enamelled copper wire ten items, 250 and 660 V grades. Union of Burma Purchase Board, St. John's Rd, Rangoon. B.o.T. (ESB/17185 and 6/60).*

22 July—New Zealand. Five items distribution transformers from 200 to 750 kVA in quantities of from 1 to 4. Conductors, eight items, in 7/·052, 7/·064, 19/·083, 19/·052, 19/·064 24, 840 yd to 55 miles. Town Clerk, P.O. Box 803, Dunedin. B.o.T. ESB/17192 and 3/60).*

25 July—America. Three 230 kV combination current and potential transformers. City of Seattle, 511 County-City Building, Seattle 4, Washington. B.o.T. (ESB/17154/60).*

27 July—Sudan. Lighting fittings, control boxes and mercury lamps. Sudan Government Purchasing Agent, 3/5 Cleveland Row, St James's, S.W.1. B.o.T. (ESB/17197/60).*

29 July—New Zealand. 10,000 yd 3 core ·25 sq in 11 kV cable. Chairman, Auckland Electric Power Board, Queen St. B.o.T. (ESB/17153/60).*

4 Aug.—India. Two 16,500 g.p.m. circulating water pumps, pumphouse equipment and travelling screens for Riverside Power Hse. General Manager, K. C. Gupta, 14-71 Civil Lines, Kanpur. B.o.T. (ESB/16660/60).*

6 Aug.—Nigeria. 12,000 s.ph. h.s. meters. Resident Engr, Electricity Corpn of Nigeria, care of Adelphi, John Adam St, W.C.2.

8 Aug.—India. Distribution type lightning arrestors. Superintending Engineer, Technical (Elec.), 157 Mount Rd, Madras 2. B.o.T. (ESB/16663/60).*

18 Aug.—Australia. Turbo-alternator (No 5) for Mount Gambier Power Station. Design Dept, Electricity Trust of S. Australia, Hindmarsh St, Adelaide. B.o.T. (ESB/17706/60).*

22 Aug.—Sudan. 5,000 yd 600 pair, 3,000 yd 200 pair and 5,000 yd 15 pair underground telephone cable. Controller Stores and Workshops, Dept of Posts and Telegraphs, Light Industrial Area, Khartoum South. B.o.T. (ESB/17395/60).*

25 Aug.—America. Two 58,000 kVA, 13·2/161 kV 3ph transformers for Greers Ferry Power Plant, Little Red River, Little Rock District Corps of Engrs, Little Rock, Arkansas. B.o.T. (ESB/17701/60).*

29 Aug.—India. 132 kV transformers for Sumer Power Station of Umiam (Barapani) H.E. Project. Details from Addl. Chief Engineer, Electrical, Assam State Electricity Board, Lachumiere, Shillong, fee Rs. 15, by crossed P.O., payable to Addl. Chief Engr.

9 Sept.—Portuguese East Africa. Measuring instruments and testing equipment for h.t. and l.t. o/h lines and cables. Ports, Railways and Transport Dept., Lourenco Marques. B.o.T. (ESB/15945/60).*

CONTRACTS PLACED

Bradford C.C. Electrical work on Allerton housing estate, G. Norton and Co. Ltd., £4,419. Recommended.

Durham C.C. Electrical installations in: Felling Bill Quay County and Modern School and in Stanhope County School, Storey and Crowe Ltd., £1,655 and £430; in Billingham New Day School, Edgar Phillips Ltd., £1,881; in canteen/scullery, Felling St. John Baptist School, Sanderson Electricals Ltd., £165; in Felling Leam La Roman Rd County School, Williams Bros. (Electrical) Ltd., £288. Recommended.

Luton B.C. Rewiring 50 houses at Hartsfield Rd and electrical installation in kitchen/dining hall at Stopsley Primary School, J. H. Burtenshaw, £1,786 and £717.

Newcastle-on-Tyne Hospitals Board. Electrical work in: new admission unit and two convalescent villas at Garlands Hospital, Carlisle, G. Bowman Ltd., £20,848; additions to Sunderland Maternity Hospital, R. H. Patterson, £1,192.

Scunthope. Electrical installations in shops and flats at Healey Rd, Hobson and Hammond (Electrical) Ltd., £1,027.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Bib. 799,243. Class 9. Instruments, etc. Multicore Solders Ltd., Vogue Hse, Hanover Sq, W.1.

Biotan. 793,603. Class 10. Ultra-violet ray appliances and u.v. appliances combined with infra-red appliances. Perihel Ltd., 44 Brunel Rd, W.3.

Casco. 796,318. Class 9. Apparatus, etc. Casemakers Ltd., 222 Soho Hill, Handsworth, Birmingham 19.

Divomatic Master. 799,338. Class 9. Apparatus for automatically controlling the flow of liquids, etc. Diversey (U.K.) Ltd., 42-46 Weymouth St, W.1.

Duodia. 778,897. Class 9. Control knobs, etc. Beckman Instruments Inc., 2,500 Fullerton Rd, Fullerton, California, U.S.A.

Minstrelle. 801,462. Class 9. Instruments, etc. Simon Equipment Ltd., Recorder Hse, 48-50 George St, Portman Sq, W.1.

Perma-Torq. 791,254. Class 9. Apparatus, etc. Cambridge Thermionic Corpn., 445 Concord Ave, Cambridge, Massachusetts, U.S.A.

Rapture. 803,361. Class 9. Radio and television apparatus. Kolster Brandes Ltd., Cray Wks, St. Mary Cray, Kent.

Simlac. 797,631. Class 9. Computing machines, etc. Short Bros. and Harland Ltd., Seaplane Wks, Queen's Island, Belfast.

Tep. 801,042. Class 9. Apparatus, etc. Techograph Electronic Products Ltd., 207 Fleet Rd, Fleet, Hants.

Uk-an. 795,268. Class 9. Electrical connections. Plessey Co. Ltd., 1 Broad St Pl, E.C.2.

TRADE NOTES

Change of Address. Early next month Stone-Chance Ltd., together with its subsidiary companies Austinlite Ltd. and Sumo Pumps Ltd., moves to Schomberg House at 82 Pall Mall, where it will be joined by its sister company, Hayward Tyler Ltd.

Griffin Smith and Partners, consulting engineers, have moved to Redeham Hall, Burstow, Surrey. Telephone Smallfield 2221.

Birmingham representation. Evershed and Vignoles Ltd. have reorganised their Birmingham representation. They have opened a branch office at 58 Oxford St, Birmingham 5, which will cover Derbyshire, Leics, Salop, Notts, Staffs, Warwicks and Worcs. Management of the office will be under Mr E. R. O'Dell. The company's business in that area has been handled for over 50 years by S. T. Pemberton and Co.

Midland Office. Crofts (Engineers) Ltd., have opened a new office, showroom and warehouse at Great Lister Street, Birmingham.

Distributors. Stanley Cox and Co. Ltd., 93-97 New Cavendish St, W.1, have been appointed sole distributors for Kelvin Hughes operating theatre light fittings. The agreement covers sales in the UK and overseas, with the exception of Canada and USA.

BUSINESS PROSPECTS

Armagh. Cullen and Davison, 41 High St, Portadown, plan Kernan factory.—U.D.C. Tender: 86 Drumarge dwellings. Surveyor.

Ashton-under-Lyne B.C. Tender: 90 flats, 10-storey block, 54 flats and 16 houses, Charlestown. Surveyor.

Aylesford. A. E. Reed and Co., 105 Piccadilly, W.1, plan £450,000 development centre.

Ballyclare. F. B. McKee and Co., 9 Shore Rd, Belfast, contractors for Jeremiah Ambler (Ulster) 40,000 sq ft factory.

Barking. F. R. Bullen and Ptnrs, Dacre Hse, Dean Farrar St, S.W.1, architects for Invicta Foil and Cheswright and Nicholls £40,000 extensions.

Basildon. Dewey and Lamy, Elvedon Rd, Park Royal, N.W.10, plan industrial premises.

Basingstoke. Lansing-Bagnall, Kingsclere Rd, plan factory and office block.—L. M. Van Moppes and Sons, Winchester Rd, plan works/offices/stores building, Lister Rd.

Blackpool. T. M. Nutbrown, Walker St, plan Preston New Rd and Clifton Rd industrial premises.—E. Cowpe plans five-acre development, Moor Park Ave.

Bolton. E.C. plan Technical Teacher Training College, Ash Law site hostel.

Bromley B.C. Tender: 27 Crown La flats. Engineer.

Bridgwater. Vincent A. M. Barton, 33a High St, architect for Quantock Rd R.C. school for Diocese of Clifton.

Brighton B.C. Tender: Mile Oak Pumping Station, Portslade. Waterworks Engineer.

Bristol. Multi-storey car park, etc., planned at Fairfax St by Shop Construction Co.

Burgess Hill. Clive Pascall and Peter Watson, 24 Half Moon St, W.1, architects for 36 Junction Rd flats.

Burnley. Joseph Lucas plan Elm St factory alterations.—T. Foster Ltd. plan Habergham Mill extensions.

Burton-on-Trent B.C. Tender: 80 Calais Rd flats. Architect.

Carmarthenshire. B.M.C. plan Felinfoel plant on 230-acre site.

Chatham B.C. Tender: 21 houses, one block 36 maisonnettes, seven flatlets, one block 16 maisonnettes and three flatlets, Hardstone redevelopment. Engineer.

Cheltenham. Gloucestershire Marketing Soc., Market St, plan Alstone La grading/packing building.—Dowty Fuel Systems, Hatherley La, plan 24,000 sq ft extension for administrative space.—Spirax-Sarco, 14 Cirencester Rd, plan 22,000 sq ft. Tennyson Rd premises extensions.

Crook. £250,000 refractories manufacturing plant for West Hunwick Silica and Firebrick Co, G. Stephensons Ltd., Chester St, Bishop Auckland, contractors.

Croydon. Scott and Westmorland, 47 Bedford Row, W.C.1, architects for Godfrey Phillips' Mill La factory.—Russell Engineering Co. plan alterations, 89 Gloucester Rd.

Dagenham. Factory extensions for: Art Steel Equipment at Fowler Rd: W. Smith (Contractors) at Peregrine Rd; Hallam Metals at Selinas La; Shapira Ltd. at Fowler Rd and Bendas and Bendas at Roebuck Rd.

Darlington. Newcastle Regional Hospital Board plan laboratory and out-patients' dept., Memorial Hospital.

Devon. Tender: N. Devon Water Board Meshaw Moor Booster Pumphouse. Rofe and Raffety, 9 Brewer's Green, S.W.1. Engineer.

Doncaster. Large-scale development scheme planned for Royal Infirmary.

Dundee T.C. Tender: 522 houses, Midhill estate and Linlathen estate. Architect.

Eccles B.C. Tender: 90 flats on four sites. Architect, Frank Bradley, Penny Bank Chmbrs, 4 Wood St, Bolton.

Exeter. Marsh Barton trading estate land for Associated British Foods.—Walsall Conduits, Smythen St, plan Bartholomew St development.

Gillingham B.C. Tender: 39 dwellings, Britton St redevelopment area. Engineer.—John Laing and Son, Mill Hill, N.W.7, contractors for £1,300,000 factory for Bowater-Eburite Flexible Packaging.

Glasgow. Town and City Properties Ltd., Ormond Hse, St. James St, S.W.1, plan Gt. Western Rd houses/shops.—B.B.C. plan Hamilton Drive, Queen Margaret Drive, extensions.

Grangemouth. British Hydrocarbon Chemicals plan £816,500 chemical plants with cooling tower and offices.

Guildford. Scott, Brownrigg and Turner, 32 London Rd, architects for £100,000 theatre and restaurant, River Way.

Hartlepool. The Steetley Magnesite Co. plan £3 million works development.

Ilford B.C. Tender: St. Augustine's school kitchen. Engineer.

Kidderminster. T. and A. Naylor, Foley Mill, Stourport Rd, plan extensions.

Kirkby U.D.C. Tender: Three community centres each of 2,700 sq ft. Engineer.

Lancs. C.E. schools planned at Slyne-with-Hest and Hornby.

Leeds. Norman and Dawbarn, 7 Portland Pl, W.1, architects for airport terminal buildings and stores for Leeds and Bradford Airport Joint Committee.

Leics C.C. Phase 2, £227,740 Hinckley Grammar School planned. Architect.

London. Tender: Cambridge Heath Rd factory for Schaverien Sheet and Metal Engineering Co. Architects: Victor Kerr and Colburn, 7 Bedford Row, W.C.1.—C. E. Ball and Ptnrs, 36 Fitzroy Sq, W.1, architects for £200,000 conversion of British Drug Houses premises.—Tender: C.E.G.B., Southern Project Group, £100,000 office block. Architects: Farmer and Dark, Romney Hse, Tufton St, S.W.1.—Frederick S. Snow and Ptnrs, 144 Southwark St, S.E.1, architects for Kestner Evaporator and Engineering Co.'s S.E.7 buildings.—McVitie and Price, Harlesden, N.W.10, to buy 840 sq ft land, Harlesden.—McLaughlin and Harvey, 24 Highbury Gro, N.5, contractors for £130,000 London College of Secretaries headquarters, Park Cres, W.1.—Adams, Holden and Pearson, 38 Gordon Sq, W.C.1, architects for University College Hospital six-storey dental dept.—Thomas Lowe and Sons, Broadway Chmbrs, Hammersmith, W.6, contractors for £50,000 extensions to Gt. Ormond St Hospital, W.C.1.—Bernard Gold and Ptnrs, 6 Saville Row, W.1, architects for 19-storey Wood St, E.C., premises.—Oscar Garry and Ptnrs, 66 Gloucester Pl, W.1, architects for Farring Developments' High Rd, N.20, office block.—Stafford and Pollard, 24 Princes St, W.1, architects for 11-storey office block.—T. P. Bennett and Son, 43 Bloomsbury Sq, W.C.1, architects for £250,000 Portman Sq office block for Portman Building Society.—R. Seifert and Ptnrs, 28 Gt. Ormond St, W.C.1, architects for £60,000 Frith St, Soho, office block.

Loughborough T.C. Wm. Davis and Co., contractors for £45,484 flats, Pinfold St.

Maidstone B.C. Tender: 50-unit hostel, Shepway estate; 72 flats, Parkwood estate. Engineer.

Manchester. Saul Goldstone, 169 Burton Rd, Didsbury, plans poultry processing factory, Collingham St. £850,000 stage 1, £2,100,000 plan for University halls of residence scheme, Fallowfield, to begin next year.—Salford R.C. Diocesan Trustees plan Clare Rd, Levenshulme, school.

Middlesbrough. Evans, Cartwright and Woollatt, 6 Clarendon St, Nottingham, architects for £500,000 redevelopment project at Dundas St for Metropolitan Railway Surplus Land Co.—John Fullerton and Tusler, 142 Wigmore St, Portman Sq, W.1, architects for 204-bedroom hotel, six shops, petrol station and flats for M.D.M. Investments.—Marway Builders Ltd, Nunthorpe, contractors for 26 Easterside houses.—Kitching and Co., 21 Albert Rd, architects for H. Whitfield's two-storey car park.—Newrick and Blackbell, 58 John St, Sunderland, architects for Royal Globe Insurance Group's Albert Rd three-storey office block.

Morley B.C. Tender: 28 bungalows, Moorhead estate. Engineer.

Neath R.D.C. Tender: 104 Caewern site dwellings. Engineer and Surveyor.

Newburn. Hindmarsh and Ptnrs, 107 Northumberland St, Newcastle, plan Westerhope office block.

Newcastle. Regional Hospital Board, Benfield Rd, plans new Stockton and Thornaby Hospital operating theatre, a two-storey sanitary annexe at Ingham Infirmary, a department of physical medicine at Middlesbrough General and headquarters extensions. Own architect. W. N. Hower, 18 Heaton Rd, contractors for H. Row Ltd, soft drink factory, Back Condercum Rd. Rev. E. Flynn, 233 Whickham View, Lemington, among promotors of school at Fox and Hounds La.—J. T. Bell and Sons, Market St, contractors for Neville St offices block.—T.C. plans 15-storey flat block St Cuthbert's Rd. Architect.

Newport. Welsh Hospital Board plan new blocks to Gwent Hospital on 17-acre site.

Northampton R.D.C. 26 bungalows, five houses planned for three sites. £53,796.

Northumberland. R. W. Bell and Co., Jesmond, Newcastle, contractors for £300,000 Southeast Northumberland Technical College.—Cawood Wharton and Co., Harrogate, contractors for £4,000 and £10,000 additions to two schools.

Norwich. Norfolk and Norwich Hospital extensions, etc., £280,000, planned by Hospital Management Committee.

Nottingham. Bulwell Finishing Co. plan factory extensions, Bulwell.

Notts C.C. £900,000 plan for two schools, Ollerton and Kirby-in-Ashfield.

Oxford. R.C. Authorities plan primary school for Blackbird Leys estate, etc.

Peterborough. King's School improvements, £77,000, planned. Architect to Joint Education Board, Bridge St.

Plymstock. Associated Portland Cement Manufacturers, Portland Hse, Tothill St, S.W.1, plan £2 million works extensions.

Prudhoe U.D.C. 33 West Wylam houses planned. Architect, J. M. Angus, 3 Gallowgate, Newcastle.

Ramsgate. Nethercourt Estates Ltd., c/o H. G. A. Waldron, architect, 17 Chapel Pl, plan 65 Eskdale Ave bungalows.

Romford. T. H. Bates, Harold Wood, Romford, contractors for £100,000 Spring Gdns factory for Colvern Ltd.

Rushden U.D.C. Three-storey flat block planned for Grafton Rd, Surveyor.

Saffron Walden. Pye Radio and Television plan factory.

Sedgefield. Henderson Bros, Smith St, Tyne Dock, S. Shields, contractors for £25,000 alterations to Winterton Hospital.

Sedgley. Wentworth and Farnell, 20 Eve La, Upper Gornal, plan Dormston Trading Estate factory.—Gibbons (Dudley), Dibdale Wks, Lower Gornal, plan machine shop extensions.

Sheffield. J. C. Plant Ltd., contractors for Albert Rd factory, for Dixon Pitchford.

Shipley. Kitson, Parish, Ledgard and Pyman, Lloyds Bank Chmbrs, Vicar La, Leeds 1, architects for C. F. Taylor and Co. factory extensions, Lower Holme and Airdale Mills.

Smethwick. Midland Motor Cylinder Co. plan camshaft foundry, North Works, Dartmouth Rd, and shop at Roebuck La.

Southall. £79,070 home for old people planned.

Southampton. Robert Potter and R. H. Hare, De Vaux Hse, Salisbury, Wilts, architects for University halls of residence, South Stoneham Hse.

Business Prospects—Continued

Stafford. Sandy and Norris, 134 Newport Rd, architects for £141,000 R.C. school, Rowley Ave and Brunswick Terr.

Tynemouth. Wm Stockdale, 73 Howard St, N. Shields, architect for Priory Theatre. —Wood and Pigg, 17a Northumberland Sq, N. Shields, architects for G. S. Robinson & Co. extensions, Sheet Metal Works.—J. W. Summers and Ptnrs, 78 Howard St, N. Shields, architects for High School art rooms, etc.

Wellington R.D.C., Salop. Tender: 25 houses, Wrockwardine. Documents from J. Brian Cooper, 38 Highfield Rd, Edgbaston, Birmingham 3.

Westbury. Associated Portland Cement Manufacturing Co., Portland Hse, Tothill St, S.W.1, plan Trowbridge Rd factory.

Whetstone P.C. £700 street lighting improvements planned. Clerk.

Wimbledon. Ronald Lyon Construction, Lion Rd, Hersham, Surrey, contractors for £600,000 shopping centre, Wimbledon Broadway, on Cawdells site.

Worthing. Feast and Anderson, 52 Upper Berkeley St, W.1, architects for Lloyds Bank Ltd. offices, The Causeway.

Wrexham B.C. Tender: 16 dwellings and garages, Queen's Park. Engineer.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

Adamlong Ltd., 13 Bath Rd, Wolverhampton. Manufacturers of and dealers in domestic and general electrical equipment, etc. Nom. cap.: £100. Dirs.: Robert L. Macadam and John P. Long.

Allenby and Stokell (Holdings) Ltd., 83 Back New Briggate, Leeds 2. Electricians, engineers, etc. Nom. cap.: £100. Dirs.: Geo. W. Allenby and Mrs E. Allenby.

Building and Electrical Traders Supplies Ltd., 23 Rink St, Fallowfield, Manchester 14. Nom. cap.: £1,000. Dirs.: Chas. Quinn and Wm. Tyler.

Cox and Co. (Crowthorne) Ltd. Electrical and electronic engineers and contractors, etc. Nom. cap.: £500. Dir.: Dennis P. Cox, Pensford, Green La, Crowthorne, Berks. Sub.: Audrey Cox.

N. R. Dyer Ltd., 240 Brockhurst Rd, Gosport. Nom. cap.: £1,000. Buyers and sellers of and dealers in cooking and heating apparatus and appliances, washing machines, refrigerators, etc. Dirs.: Norman R. Dyer and Mrs Anne Dyer.

Ergonomics Ltd., 42 Hanway St, W.1. To carry out research on design in industry and commerce, etc. Nom. cap.: £100. Dirs.: Kathleen M. Black, Timothy R. L. Black and Phyllis G. Barnacle.

Gull Electrical Ltd., 10 Grimston St, Leeds 9. Nom. cap.: £100. Dir.: Malcolm Birkenshaw.

G. T. Hale Electrical Appliances Ltd., 245-9 Whitechapel Rd, E.1. Nom. cap.: £1,000. Dirs.: George T. Hale, Harold Wayne and Angelo O. Fiteri.

Harries Electrical Ltd., 3 Laurence Pountney Hill, E.C.4. Nom. cap.: £25,000. Dirs.: William Harries, William F. Harries and Stanley B. Harries.

Harrison Wagdin Ltd., 191 Latimer Rd, W.10. Electrical engineers, etc. Nom. cap.: £100. Dirs.: Brian Harrison and Alfred J. Wagdin.

R. G. D. King Electrical Co. Ltd. Nom. cap.: £1,000. Dirs.: not named. Subs.: Richard G. D. King and Marjorie T. King, 17 Hill Grove, Henleaze, Bristol.

Leozamp Co. Ltd. Designers, manufacturers of and dealers in television, radio, electrical, electronic and telephone goods, apparatus, etc. Nom. cap.: £500. Permanent dirs.: Lionel S. Sharman and Monica B. Sharman, Heathfield, Rode Hill, Rode, near Bath.

Malies Instruments Ltd., 3 Port Hall Mews, Dyke Rd, Brighton 5. Makers of and dealers in scientific, optical, mechanical, electrical and engineering instruments, etc. Nom. cap.: £100. Dirs.: Harold M. Malies and Sydney D. Guy.

Ossicaide Ltd., 22-24 Kensington Church St, W.8. Manufacturers of and dealers in hearing aids, etc. Nom. cap.: £5,000. Dirs.: Victor A. Foot and Constance L. Jacoby.

Platt-Schindler Lifts Ltd. To enter into an agreement marked "A" made between Schindler and Co. Ltd., of Lucerne, Switzerland, and Stone-Platt Industries Ltd., and an agreement marked "B" with Stone-Platt Industries Ltd., to carry on in the territories set forth in the said agreements the business of manufacturing, installing and maintaining lifts, escalators, etc. Nom. cap.: £100,000. Dirs.: Arthur P. H. Aitken, John H. Morris, Peter A. Peterson, Alfred F. Schindler, Otto L. Theiler and Hermann Knoll. Subs.: M. I. Wordley and Ellen Tindell, 59-67 Gresham St, E.C.2.

Pointings Electrical Ltd., 15 Boltro Rd, Haywards Heath, Sussex. Manufacturers of and dealers in radio, electrical and mechanical apparatus, etc. Nom. cap.: £1,000. Dirs.: not named. Subs.: Donald F. Lee and Neill A. Pointing.

Products Analysis Ltd., 13 Sheepridge Rd, Sheepridge, Huddersfield. Manufacturers of and dealers in electrical products, etc. Nom. cap.: £100. Dirs.: Maurice S. Wheller and Philip B. Sherman.

Solace Engineering and Electrical Co. Ltd., Reedham St, S.E.15. Nom. cap.: £5,000. Dirs.: Montague J. Ward, Henry J. S. Hayward and Roy D. Jiggens.

Startronic Ltd. Designers and manufacturers of and dealers in electronic, electrical and electro-mechanical instruments, etc. Nom. cap.: £15,100. Permanent dirs.: Peter C. Robinson, 65 Coombe Gdns, New Malden, Surrey; Chas. J. Smith, "Cornerway," Beech Close, Sandy La, Cobham, Surrey; and Stella M. Sueter.

Teleconomy Ltd. Manufacturers of and dealers in private automatic exchange equipment and apparatus, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Marion Wix and Kathleen Sellers, 59-67 Gresham St, E.C.2.

H. W. Turner (Ipswich) Ltd., 104 St. Helens St, Ipswich. To take over business of an electrical contractor carried on at Ipswich by Harry W. Turner, etc. Nom. cap.: £5,000. Dirs.: Harry W. Turner and Mrs Lilian M. Turner.

Wester Electrics (Hackney) Ltd., 107 Shacklewell La, E.8. Electrical engineers, etc. Nom. cap.: £400. Dirs.: Fredk. C. Terry, Barbara M. Terry and Stanley G. Jones.

Gazette Announcements

COMPANIES ACTS

Langton and Young Ltd. Mr R. A. Hawken, Bank Chmbrs, 1 John St, Bedford Row, W.C.1, appointed liquidator as from 10 June.

Harpoint Ltd. Mr A. W. Hunter, Walter Hse, 418-422 Strand, W.C.2, appointed liquidator at extraordinary general meeting on 1 June for the purpose of voluntarily winding-up.

Shernal Ltd. Mr A. Punchard, 51-2 Chancery La, W.C.2, appointed liquidator at extraordinary general meeting on 30 June for the purpose of voluntarily winding-up. Creditors to send details to liquidator by 31 July.

Peto Scott Electrical Instruments Ltd. Last day for receiving proofs for intended dividend: 22 July, to liquidator: K. R. Cork, 19 Eastcheap, E.C.3.

The Range Electronics Co. Ltd., 3-7 Windmill La, E.15. Winding-up order dated 4 July.

Birmingham Electronic Products Ltd. Meeting of creditors to be held at office of Hand and Co., Colmore Hse, 21 Waterloo St, Birmingham 2, on 18 July, at 12 noon.

Lithgow Electronics Ltd. Creditors to send details to liquidator: S. J. Chubb, Bartlett Hse, 9-12 Basinghall St, E.C.2, by 5 Aug.

BANKRUPTCY ACTS

Public Examinations

Cardiff. K. M. Seward, radio, television and electrical dealer, carrying on business at 2-4 St. James Arcade, Newport Rd, Roath. Public examination: 10.30 a.m., 28 Sept., at County Court, Westgate St, Cardiff.

Manchester. R. H. Dumbell, electrical goods retailer, carrying on business as L. and D. Electrics, at 330 Ashton Old Rd, Openshaw, and formerly in partnership at 233 City Rd, Hulme. Public examination: 10.30 a.m., 14 Oct., at Court Hse, Quay St, Manchester 3.

Sheffield. J. Crampton, electrical retailer, carrying on business as Grosvenor Electrics, at 125 Frederick St, Rotherham, and previously at 97 Mary St, Scunthorpe, and formerly in partnership as Grosvenor House Electrical Products at 147 Askern Rd, Bentley, Doncaster. Public examination: 2 p.m. 29 Sept. at County Court Hall, Bank St, Sheffield.

Cardiff. P. J. Ferris, electrical dealer, trading as Ferris Domestic Appliances, of 5 King's Rd, Canton. Public examination: 10.30 a.m., 28 Sept., at County Court, Government Bldgs, First Floor, Westgate St, Cardiff.

Bangor. V. L. Morgan, electrician, of "Woodlands," Bishopswood Rd, Prestatyn, Flints. Public examination: 11 a.m., 30 Sept., at Court Hse, Deiniol Rd, Bangor.

Southend. L. A. G. Ayres, carrying on business as Len's Electrics, at 710 Southchurch Rd. Public examination: 11 a.m., 13 Sept., at 102 Alexandra Rd, Southend-on-Sea.

Appointment of Trustees

High Court of Justice. H. I. Saffer, electrical goods retailer, lately carrying on business as H.S. Electrical Appliances, at 158 Stoke Newington Church St, N.16, and as H. I. Saffer, at 91 Tabernacle St, E.C.2. Mr S. G. Banister, 15 Golden Sq, W.1, appointed trustee as from 28 June.

Macclesfield. C. Davies, electrical contractor, 39 Moss Brow, West Bollington. Mr G. H. Eaves, 47 Mosley St, Manchester 2, appointed trustee as from 27 June.

Nottingham. R. M. Townroe, electrical appliance retailer, carrying on business at 13 Woodhouse Rd, Pembroke St and Somersall St, Mansfield, also formerly at 65 Gateford Rd, Worksop. Mr C. E. Turton, 91 Talbot St, Nottingham, appointed trustee as from 4 July.

Dividend

Rochester. C. E. Purcell, electrical contractor, lately carrying on business as Edward Purcell and Son, at 13 Wrotham Rd, Gravesend. Dividend per £: 20s, with 4% statutory interest payable at Official Receiver's Office, 40 St. Margaret's St, Rochester, on 19 July.

Intended Dividends

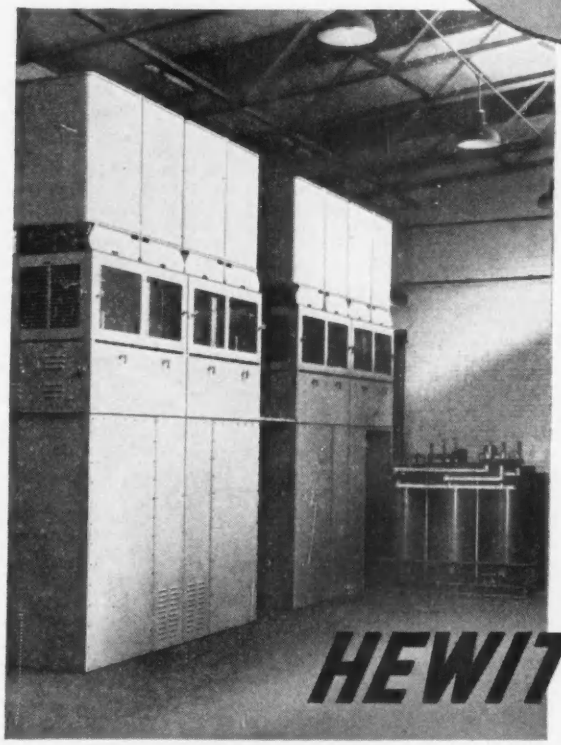
Burton upon Trent. M. Horton and A. E. Wheildon, electrical and mechanical engineers, carrying on business in partnership as Monarch Electrics, at 6 Victoria Rd. Last day for receiving proofs for intended dividend: 21 July, to trustee: A. W. Hunter, Walter Hse, 418-422 Strand, W.C.2.

Barrow-in-Furness. R. E. Browne, electrical contractor, carrying on business as Browne Bros., at 121 Market St, Dalton-in-Furness. Last day for receiving proofs for intended dividend: 23 July, to trustee: D. Atkinson, 14 Lowther St, Carlisle.

MEETING TO NOTE

THURSDAY, 21 JULY

I.E.E. (Electronics and Communications Section). Third International Conference on Medical Electronics at Olympia until 27 July.



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The photograph, left, shows two 1,500 kW equipments. One of the two main transformers in the farther set is withdrawn to show its location.

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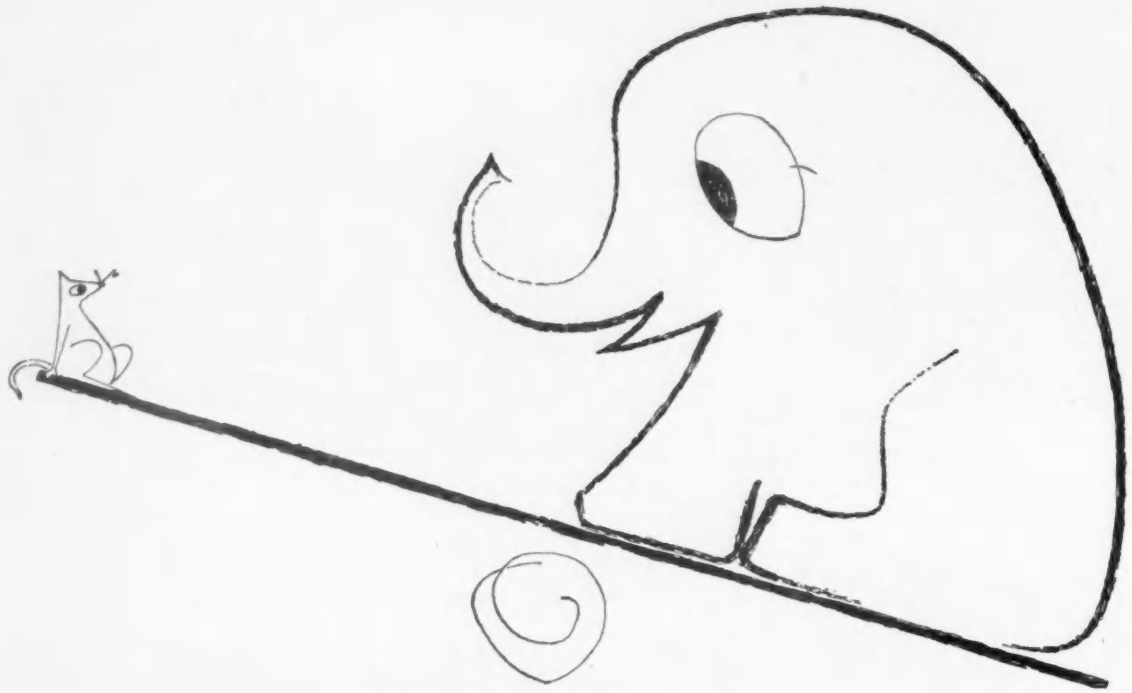
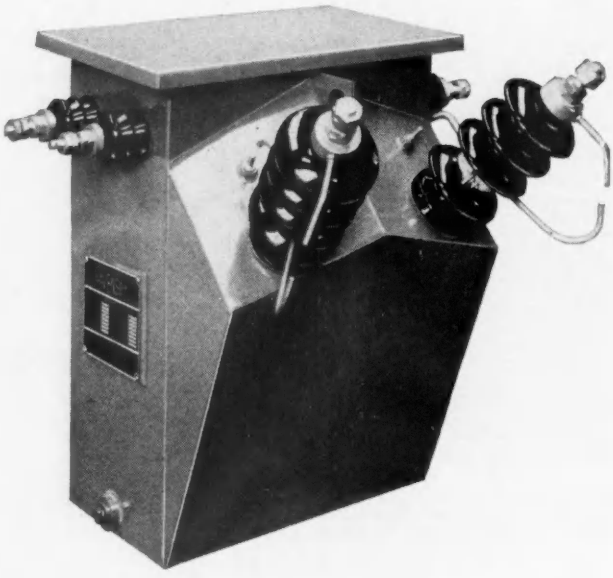
OVERSEAS REPRESENTATIVES: ARGENTINA: H. R. Roberts & Cia., S.R.L. Buenos Aires. **AUSTRALIA:** Hackbridge and Hewittic Electric Co. Ltd., 171 Fitzroy Street, St. Kilda, Victoria; N.S.W.: Queensland: W. Australia: Elder, Smith & Co. Ltd.; South Australia: Parsons & Robertson Ltd.; Tasmania: H. M. Bamford & Sons (Pty.) Ltd., Hobart. **BARBADOS** and surrounding islands: Electric Sales & Service Ltd., St. Michael. **BELGIUM & LUXEMBOURG:** Pierre Pollie, Brussels, 3. **BRAZIL:** Oscar G. Mors, Sao Paulo. **BRITISH GUIANA:** Dandor Commission Agency, Georgetown. **BURMA:** Neonlite Manufacturing & Trading Co. Ltd., Rangoon. **CANADA:** Hackbridge and Hewittic Electric Co. of Canada Ltd., Montreal; The Northern Electric Co. Ltd., Montreal, etc. **CEYLON:** Envee Ess Ltd., Colombo. **CHILE:** Sociedad Importadora del Pacifico Ltda., Santiago. **EAST AFRICA:** G. A. Neumann Ltd., Nairobi. **EGYPT:** Giacomo Cohenca Fils, S.A.E., Cairo. **FINLAND:** Sahko-ja Konellike O.Y. Hermes, Helsinki. **GHANA, NIGERIA & SIERRA LEONE:** Glyndova Ltd. **GREECE:** Charilaos C. Coromeos, Athens. **INDIA:** Steam & Mining Equipment (India) Private Ltd., Calcutta; Easun Engineering Co. Ltd., Madras, 1. **IRAQ:** J. P. Bahoshy Bros., Baghdad. **MALAYA, SINGAPORE & BORNEO:** Harper, Gilfillan & Co. Ltd., Kuala Lumpur. **NETHERLANDS:** J. Kater, E.O., Ouderkerk a.d. Amstel. **NEW ZEALAND:** Richardson, McCabe & Co. Ltd., Wellington, etc. **PAKISTAN:** The Karachi Radio Co., Karachi, 3. **SOUTH AFRICA:** Arthur Trevor Williams (Pty.) Ltd., Johannesburg, etc. **CENTRAL AFRICAN FEDERATION:** Arthur Trevor Williams (Pty.) Ltd., Salisbury. **THAILAND:** Vichien Phanich Co. Ltd., Bangkok. **TRINIDAD & TOBAGO:** Thomas Peake & Co., Port of Spain. **TURKEY:** Dr. H. Salim Oker, Ankara. **URUGUAY:** Ciuna Ltda., Montevideo. **U.S.A.:** Hackbridge and Hewittic Electric Co. Ltd., P.O. Box 234, Pittsburgh 30, Pennsylvania. **VENEZUELA:** Oficina de Ingenieria Sociedad Anonima, Caracas.



up and down the country

round and round the world, DAVENSET Transformers are being used in ever-increasing quantities because they are dependable. Discerning buyers everywhere are specifying DAVENSET Transformers because they are made under modern conditions using advanced design techniques that combine quality with lowest cost. If you use transformers you should investigate the DAVENSET range of single and three-phase units, available in sizes from 5 VA to 500 kVA for operation under any climatic or artificial conditions.

DAVENSET Transformers are made to required standards of the Canadian Standards Association.



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Distribution of electricity in Rural Areas.
Electric Furnaces.
Low voltage Tools and Handlamps.
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Soil heating.
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College of Technology

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(a) ELECTRICAL MACHINES LABORATORY
(b) STEAM ENGINES LABORATORY

The work involved would be, in each case, the preparation of detailed layouts and specifications in co-operation with the specialist teaching staff, undertaking inquiries and obtaining quotations for approved machines, arranging for the purchase and storage of machines pending installation, manufacturing main control boards and subsidiary controls to agreed specifications, and carrying out the complete installation of machines and wiring from main supply points or pipe-runs, as the case may be. The firms tendering may nominate specialist sub-contractors for approval.

The College of Technology buildings are expected to be started this year, and the first stage (Engineering and Science, Administration and Library) should be completed within two years.

Inquiries, with particulars of similar works carried out, should be addressed to Chief Education Officer (Ref. 57/66), Education Department, Civic Centre, Southampton. (R 423)

BOROUGH OF DROITWICH
STREET LIGHTING—A38

TENDERS are invited from experienced contractors for the supply, delivery and erection of 55 No. Plain Steel Street Lighting Columns, 30 ft mounting height, with 200 watt sodium lamps, together with wiring, lanterns and auxiliary gear, and the dismantling of 55 No. Existing Lighting Points.

Conditions of Contract and plan may be inspected at, and Specification, Bill of Quantities, and Form of Tender obtained from the Borough Engineer and Surveyor, Town Hall, Droitwich, during normal office hours upon payment of a deposit of £2 2s which sum will be returned on receipt of a bona fide tender and the return of all documents.

Tenders, in plain sealed envelopes, endorsed "Street Lighting—A38" to be delivered to the undersigned not later than 10 a.m. on Thursday, 28 July, 1960.

The Council do not bind themselves to accept the lowest or any tender.

S. G. FOSTER,
Town Clerk.

Town Hall,
Droitwich, Worcs. (R 421)

CITY OF MANCHESTER
Housing Committee

TENDERS invited (returnable noon 25 July, 1960) for Electrical Installations to 65 houses and flats at Contract 317, Maple Rd, Brooklands.

Particulars and documents from Director of Housing, Town Hall, Manchester 2. (R 380)

ISLINGTON BOROUGH COUNCIL

INVITES tenders for the design, provision and installation of a system of floodlighting at Market Rd Playground. Tender documents available from the Borough Engineer and Surveyor, Town Hall, Upper St, N.1, are returnable not later than noon on Tuesday, 16 Aug., 1960. (R 399)

APPOINTMENTS VACANT

CENTRAL ELECTRICITY GENERATING BOARD
Midlands Division
STATION SHIFT CONTROL ENGINEER

REQUIRED at Hams Hall "C" Power Station, near Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade K.10, £950/£1,055 per annum, plus 10% of basic salary for shift duties.

A sound technical training and practical experience in the control of steam generating plant and main switchgear are required. Appropriate technical qualifications an advantage.

Apply, quoting Vacancy No. 182/60MD on form AE6, available from the Station Superintendent, Hams Hall Power Station, Lea Marston, Sutton Coldfield, Warwickshire. Closing date for receipt of applications: 29 July, 1960. (R 411)

SOUTHERN ELECTRICITY BOARD
ASSISTANT ENGINEER
(MAINTENANCE AND OPERATION)

HESTON District of No. 1 (Southall) Sub-Area. Salary: N.J.B. Class G, Grade 9 (£895/£980 per annum, inclusive of London Allowance). N.J.B. Conditions of Service.

The duties of the post will be to assist with the maintenance and operation of switchgear, transformers, auxiliary gear and underground cables up to and including 11 kV. The appointment will involve stand-by duties.

The successful applicant will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 2-6 Windmill La, Southall, Middlesex, and returned to him, quoting Z.1197, not later than 25 July, 1960. (R 410)

CENTRAL ELECTRICITY GENERATING BOARD
Southern Division
ASSISTANT SHIFT CHARGE ENGINEER
MARCHWOOD GENERATING STATION
SEC/3.91.

APPLICANTS should have had previous experience in a modern generating station, preferably one with high operating temperatures and pressures.

Preference will be given to those possessing qualifications leading to corporate membership of a recognised professional engineering institution, or equivalent qualifications.

Salary: N.J.B. L.8, £1,155/£1,305.

Special application forms (Not AE6/ACT) obtainable only from Divisional Secretary, 111 High St, Portsmouth, should be returned by 27 July, 1960. (R 417)

CENTRAL ELECTRICITY GENERATING BOARD
South Eastern Division
LITTLEBROOK POWER STATION
VACANCY No. 105A/60.
ASSISTANT ENGINEER (EFFICIENCY)

CANDIDATES should possess at least H.N.C. or equivalent qualification and practical experience in generating station work would be an advantage. The successful candidate will be required to assist the Station Efficiency Engineer in investigating the thermal performance of the plant and will be required to work independently and to take the initiative in solving problems which arise.

Salary within N.J.B. Class L, Grade 14, £840/£925 per annum, including London Allowance.

Applications, giving age, details of experience, qualifications, present position, etc., should be sent to the Station Superintendent, Littlebrook Generating Station, Nr Dartford, Kent, to arrive by 27 July, 1960.

W. H. DUNKLEY,
Divisional Controller.
(R 379)

NIGERIAN COLLEGE OF ARTS, SCIENCE AND TECHNOLOGY

APPLICATIONS are invited for a SENIOR TECHNOLOGIST or a TECHNOLOGIST for the engineering laboratory and workshops for students preparing for University of London B.Sc. (Eng.) in Special Relationship.

Qualifications: H.N.C. or O.N.C. or appropriate City and Guilds qualification in Telecommunications. Good experience on maintenance and construction of electronic equipment and instrument maintenance essential.

Contract Salary Scales: Technologist £756/£1,284 p.a. Senior Technologist £1,140/£1,440 p.a. both plus inducement addition of £180/£300 p.a. for overseas appointees and gratuity at £25 or £37 10s for each completed three months' residential service. Entry point according to qualifications and experience.

Partly furnished houses at one-twelfth basic salary rental. Tours 15-18 months. Children's U.K. maintenance grant up to £150 p.a. and passages assistance.

Applications (eight copies) giving age, qualifications, experience and names of three referees should be sent to The Council for Overseas Colleges, 12 Lincoln's Inn Fields, London W.C.2, by 29 July, 1960. (R 388)

CENTRAL ELECTRICITY GENERATING BOARD
Midlands Division
ASSISTANT ENGINEERS (DISTRICTS)
FOURTH ASSISTANT ENGINEERS

REQUIRED in the Meaford and Birmingham Districts of the Electrical Department.

N.J.B. Agreement conditions; superannuable appointments; salary within Schedule B, Class BX, either Grade 9, 10 or 11, according to qualifications and experience. The salary ranges are as follows:

Grade 9: £840/£1,130 per annum.
Grade 10: £785/£1,055 per annum.
Grade 11: £735/£990 per annum.

Candidates should possess a Higher National Certificate in Electrical Engineering, or an equivalent qualification, and should preferably have had some experience on any type of equipment associated with E.H.V. transmission. The selected applicants may be required initially to exchange duties for a short period between the District and Divisional Headquarters. Applicants should state if they have a preference for either District.

Apply, quoting Vacancy No. 183/60MD, on Form AE6 available from the Divisional Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, not later than 29 July, 1960. (R 414)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 40s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

CENTRAL ELECTRICITY GENERATING BOARD
London Division

APPLICATIONS invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

MAINTENANCE SUPERINTENDENT
BRUNSWICK WHARF POWER STATION
Vacancy No. 60/494

Applicants for this post should have administrative experience in co-ordinating the services of Mechanical, Electrical and Instrument Maintenance Departments in a station of advanced design. Knowledge of National Agreements and Statutory requirements are essential. Experience in the preparation of projects and budgetary procedures would be an advantage. Salary: Class K, Grade 4, £1,495/£1,665 per annum.

ASSISTANT ENGINEER
(ELECTRICAL TEST)
FULHAM POWER STATION
Vacancy No. 60/495

Sound technical training preferably to H.N.C. standard with experience on all types of power station electrical plant. Salary: Class K, Grade 12, £895/£980 per annum.

Applications, quoting Vacancy No., to (or on form from) Personnel Officer, Central Electricity Generating Board, London Division, P.O. Box 136, London W.1, by 25 July, 1960. (R 385)

SOUTHERN CAMEROONS
WORKS SUPERINTENDENT
(ELECTRICAL)

REQUIRED by Public Works Department on contract for one tour 9-12 months. Salary according to age and experience up to maximum in scale (including Inducement Addition), £1,188 rising to £1,920 a year. Gratuity £37 10s for each completed three months' service. Outfit allowance £60. Free passages. Liberal leave on full salary. Candidates preferably under 40 years of age must have served full apprenticeship and possess C. and G. Final Certificate in Electrical Installation or equivalent. Successful candidate will be required to supervise all forms of electrical installation and wiring in public and domestic buildings, also installation and maintenance of workshop electrical equipment. Write to the Crown Agents, 4 Millbank, London S.W.1. State age, name in block letters, qualifications and experience and quote M2A/51075/EE. (R 386)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

North Staffs. Sub-Area
ENGINEERING DEPARTMENT
(HEADQUARTERS)

Applicants should have a sound technical education and experience in the preparation of engineering drawings and electrical diagrams. Salary: £640/£725 per annum (N.J.B. Grade L.17). Apply, by letter, stating age, experience, qualifications, present position and salary to Mr C. C. Pimble, Sub-Area Manager, Midlands Electricity Board, 234 Victoria Rd, Fenton, Stoke-on-Trent.

Worcester and District Sub-Area
SECOND ASSISTANT DISTRICT ENGINEER
(EVESHAM)

Experience necessary in all branches of distribution work including construction, maintenance and operation of high and low voltage underground and overhead systems and substations; and the planning of system reinforcements and mains extensions. Technical qualifications desirable. Salary: £890/£990 per annum (N.J.B. Grade F.7).

Apply, by letter, within 14 days, stating age, experience, present position and salary to Mr J. Johnston, District Manager, Midlands Electricity Board, 64 High St, Evesham, Worcs.

F. W. CATER,
Secretary.
(R 377)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD
Dundee Area

APPLICATIONS are invited for the under-mentioned appointment:

SECOND ASSISTANT ENGINEER
(PLANNING)

Applicants should have had a sound technical education and have obtained a Higher National Certificate or Engineering Degree. Preference will be given to Corporate Members of the Institution of Electrical Engineers.

Applicants should be well experienced in City and Rural transmission and distribution planning up to 33 kV. The successful candidate will be required to assess load development and deal with forward planning for distribution.

Duties will include planning of H.V. and L.V. reinforcements, distribution to new high density housing and City redevelopment works, also design of indoor and outdoor substations up to 33 kV.

Salary will be in accordance with National Joint Board Agreement Schedule A, Class H, Grade 7, £1,010/£1,130.

Applications should be on the standard application form obtainable from the Area Manager, Dundee Area, 7 Dudhope Crescent Rd, Dundee, and should be returned by 6 Aug., 1960. (R 400)

PATENT EXAMINERS AND PATENT OFFICERS

PENSIONABLE posts for men or women for work on the examination of Patent applications. Age at least 21 and under 29 (36 for Examiners), with extension for regular Forces service and Overseas Civil Service. Qualifications: normally first- or second-class honours degree in physics, chemistry, engineering or mathematics, or equivalent attainment, or professional qualification, e.g., A.M.I.C.E., A.M.I.Mech.E., A.M.I.E.E., A.R.I.C. London salary (men), £655/£1,460; provision for starting pay above minimum. Promotion prospects. Write Civil Service Commission, 17 North Audley St, London W.1, for application form, quoting **S/128/60**, and stating date of birth. (R 387)

CENTRAL ELECTRICITY GENERATING BOARD
Eastern Division

APPLICATIONS are invited for the following appointments:

STATION SHIFT CONTROL/BOILER
SHIFT CONTROL ENGINEER
PETERBOROUGH GENERATING STATION
(NORTHANTS)
(S.V. No. 1367)

Salary N.J.B., Class F, Grade 10, £745/£830 per annum, plus £90 Shift Allowance.

Applicants should have reached the standard of the Ordinary National Certificate in Electrical Engineering, or its equivalent, and had experience in the operation of a switchboard at a generating station and be fully conversant with high-voltage switching operations and protective systems. Experience in the operation of pulverised fuel fired steam raising plant will be an advantage.

The successful applicant will be required to interchange the duties of Station Shift Control Engineer and Boiler Shift Control Engineer.

GENERAL ASSISTANT ENGINEER
WATFORD GENERATING STATION
(HERTS)
(S.V. No. 1365)

Salary N.J.B., Class E, within the range of Grades 13/11, £550/£725 per annum plus London Weighting.

The commencing salary will depend upon the duties and responsibilities.

The duties which form a suitable background for future promotion, include assisting in chemical testing and control, and the technical operation of turbine and electrical plant.

Applications, quoting the appropriate reference S.V. No., stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, to arrive not later than 23 July, 1960. (R390)

THE SOUTH WALES ELECTRICITY BOARD
Assistant Engineer

APPLICATIONS are invited for the position of Assistant Engineer in the Neath District of the Swansea and West Central Area of the Board.

The salary for the position will be in accordance with Class F, Scale 4 (£690/£785) of the National Joint Board Agreement for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience should be sent to G. R. T. Edwards, B.SC., M.I.E.E., M.AM.I.E.E., Manager, Swansea and West Central Area, 29 Ystrad Rd, Swansea Industrial Estate, Swansea, so as to arrive not later than 23 July, 1960.

Envelopes should be marked "Assistant Engineer—81/60."

Previous applicants need not apply.

R. G. WILLIAMS,
Secretary.
(R 376)

ADEN GOVERNMENT ELECTRICITY DEPARTMENT
ASSISTANT CONSUMERS' ENGINEER

REQUIRED on contract for one tour of 18/24 months in first instance.

Commencing salary according to age and experience in scale (including Pay Differential) £1,040 rising to £1,579 a year. Supplementary allowance £144/£120. Gratuity at rate of 12½% of total salary drawn. Free passages. Outfit allowance £60.

Candidates should possess H.N.C. in Electrical Engineering or equivalent and have had technical training and experience in utilisation of electrical energy in industrial, commercial and domestic premises.

Write to the Crown Agents, 4 Millbank, London S.W.1. State age, name in block letters, qualifications and experience and quote M2A/51004/EE. (R 374)

CENTRAL ELECTRICITY GENERATING BOARD
South Eastern Division

VACANCY No. 152/60.

ASSISTANT ENGINEER
(SHIFT OPERATION)
LITTLEBROOK POWER STATION

THE successful applicant will be responsible to the Assistant Shift Charge Engineer in the "A," "B" or "C" Station for shift work duties relating to boiler and turbine operation in the Stations, with emphasis on efficient boiler house working. H.N.C., Electrical or Mechanical, or equivalent qualification is preferable and some knowledge of Control Room work would be advantageous.

Salary within N.J.B. Class L, Grade 10—£1,161/£1,293 per annum, including London Allowance and Shift Allowance.

Applications, giving age, details of previous experience, qualifications, etc., to Station Superintendent, Littlebrook Power Station, Near Dartford, Kent, to arrive by 27 July, 1960.

VACANCY No. 150/60.

FOURTH ASSISTANT ENGINEER
(OPERATION AND MAINTENANCE)
NORTHFLEET DISTRICT

Required for Operation and Maintenance work on 275 and 132 kV overhead lines, cables, transformers, switchgear, etc. Candidates should possess H.N.C. or equivalent qualification and experience on similar equipment would be an advantage.

Salary: Class AX, Grade 11—£775/£1,040 per annum, with prospect of promotion to Grade 9—£890/£1,180 per annum, including London Allowance, subject to satisfactory service.

Applications, giving age, details of previous experience, qualifications, etc., to Personnel Officer, South Eastern Division, Lower Ham Rd, Kingston upon Thames, to arrive by 27 July, 1960.

W. H. DUNKLEY,
Divisional Controller.
(R 378)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

SOUTH OF SCOTLAND ELECTRICITY BOARD

Lanarkshire Area

APPOINTMENT OF THIRD ASSISTANT DISTRICT ENGINEER (LANARK DISTRICT)

APPLICATIONS are invited for the appointment of Third Assistant District Engineer in Lanark District. Applicants should have experience in the operation and maintenance of H.V. and L.V. distribution systems, and be conversant with Load Flow Diagrams and Voltage Drop Calculations.

The conditions of service for the appointment will be in accordance with the National Joint Board Agreement and the salary will be £745/£830 per annum, Grade E9. It is a condition of this appointment that the successful applicant shall reside within a reasonable distance of the district office at Lanark and take standby duty in accordance with the above agreement.

Application forms which may be obtained from the undersigned should be returned to this office within 14 days of the date of this advertisement.

R. J. RENNIE,
Manager.

Montrose Cres,
Hamilton. (R 403)

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

GENERAL ASSISTANT ENGINEERS
HIGH MARNHAM POWER STATION
Vacancy No. 171/60.

APPLICATIONS are invited for the position of General Assistant Engineer at High Marnham Power Station, nr. Newark, Notts.

Applicants should hold the Ordinary National Certificate in Mechanical or Electrical Enginerieng. There are good opportunities for keen Engineers who are willing to study new Plant and methods.

The salary during the initial training period will depend upon qualifications and knowledge and will be within the range of £550/£725 per annum of the National Joint Board Agreement.

Closing date for receipt of applications: 29 July, 1960.

ASSISTANT SHIFT CHARGE ENGINEER
DRAKELOW "A" POWER STATION
Vacancy No. 170/60.

Applications are invited for the position of Assistant Shift Charge Engineer at Drakelow "A" Power Station, Drakelow, nr. Burton-on-Trent.

Applicants should have received a sound technical training and have had experience in a modern power station. Preference will be given to candidates who possess the Higher National Certificate, or its equivalent.

Salary will be in accordance with Class J, Grade 8 (£1,010/£1,130 per annum) of the National Joint Board Agreement, plus 10% allowance for shift dutes.

Closing date for receipt of applications 29 July, 1960.

PLANT CONTROL ENGINEER
CASTLE DONINGTON POWER STATION
Vacancy No. 172/60.

Applications are invited for the position of Plant Control Engineer at Castle Donington Power Station, nr. Derby.

Candidate should have had operating experience on large modern pulverised fuel fired boilers and associated turbines.

The possession of the Ordinary National Certificate, or the pursuit of studies leading thereto, will be an advantage.

Salary will be in accordance with Class L, Grade 10 (£1,010/£1,130 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 29 July, 1960.

These appointments will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superanuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Station Superintendent concerned, and should be returned to the Station by the date stated.

O. S. WOODS,
Divisional Controller.

8 July, 1960. (R 409)

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following position:

FOURTH ASSISTANT DISTRICT ENGINEER
EXETER
OUTPOSTED AT TIVERTON BRANCH

Salary within Class G, Grade 10, Salary Scale 6, £800/£875 per annum, of the N.J.B. Agreement.

The successful candidate will be responsible for organising the installation of services and small mains extensions, and the operation and maintenance of the Branch distribution system. He will be required to carry out engineering standby duties.

Applicants should have had experience in the operation and maintenance of overhead and underground distribution mains and equipment and should possess a Higher National Certificate in Electrical Engineering or qualifications leading to it. The ability to drive a car and the possession of a current driving licence are desirable.

Applications to be made on standard form AE6/ACT obtainable by postcard only from the District Manager, South Western Electricity Board, 3 Bedford St, Exeter. Closing date for receipt of completed applications is Saturday, 30 July, 1960. (R 415)

THE NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

1. Area Board Headquarters

CHIEF ENGINEER'S DEPARTMENT
ONE SENIOR DRAUGHTSMAN/SECTION LEADER

With location in the Drawing Office, Carliol House.

Applicants should have had a sound technical education and practical experience in the design and layout of substations and must be thoroughly conversant with civic work including the design and detail of reinforced concrete structures and foundations.

Salary: Schedule B, Grade AX9, according to qualifications, £840/£1,055 p.a. N.J.B. conditions of service.

CHIEF ENGINEER'S DEPARTMENT
TWO ASSISTANT SYSTEM CONTROL ENGINEERS

Operation and Maintenance Section, System Control Sub Section for shift duty at Aykleyheads Control Room, Durham City.

Successful applicants will be given a period of training after which they will be required to assist in the centralised control and operation of High Voltage Interconnected Distribution Networks operating at voltages up to 66 kV.

Applicants should possess H.N.C. or equivalent qualification and be conversant with the operation and maintenance of H.V. distribution equipment. Knowledge of district work or protective gear operation would be an advantage. These are junior positions in the Control Organisation and there are good prospects of promotion to higher grades as opportunities arise.

Salary: Schedule B, Grade AX11 according to qualifications and experience £808 10s/£1,023 p.a. inclusive of 10% shift allowance. N.J.B. conditions of service.

2. York Sub-Area

ONE SERVICE CENTRE SUPERVISOR
(MALE OR FEMALE)

With location in the York District.

Salary: N.J.C. Grade 4 £890/£1,010 per annum dependent on qualifications and experience in the promotion of sales of electrical appliances and display.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle-upon-Tyne 1, within ten days of the appearance of this advertisement.

(R 406)

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

FOURTH ASSISTANT ENGINEER
(OPERATIONAL RESEARCH)
GENERATION DEPARTMENT
SEC/3.89

THE work of the section involves investigation of engineering problems at generating stations throughout the Division and the application of specialised techniques in operational research to improve the effective use of plant and manpower.

Candidates should preferably possess an appropriate professional qualification and have had some operating experience in a generating station.

Previous experience in operational research would be an advantage but is not essential since opportunities for training will be given.

Salary: N.J.B. AX11 £735/£930.

Special application forms (Not AE6/ACT) obtainable only from Divisional Secretary, 111 High St, Portsmouth, should be returned by 26 July, 1960. (R 402)

LONDON ELECTRICITY BOARD

VACANCIES:
ASSISTANT DISTRIBUTION ENGINEERS
(TWO)

APPLICATIONS are invited for the above positions in the Board's North Western District at Lithos Rd, Hampstead, N.W.3.

Applicants should have a sound technical education to the standard of the Higher National Certificate and possess practical experience of all branches of engineering work associated with the organisation of a District distribution department.

The post is graded under Schedule A of the National Joint Board Agreement as Class H, Grade 9, £940 per annum, rising to £1,040 per annum, inclusive of London Allowance.

Application form obtainable from Personnel Officer, 46 New Broad St, E.C.2, to be returned completed within 14 days of the publication date of this notice. Please quote ref: PER/V/2990/T. (R 407)

THE EAST MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited from suitably qualified persons for the following appointments:

Leicester Sub-Area

Vacancy No. 88/60.
PRINCIPAL ASSISTANT
(MACHINE ACCOUNTS SECTION)

Salary: N.J.C. Grade 7, £1,250 x £35—£1,355 per annum.

A wide experience of the problems associated with the mechanisation of the accounting procedures of an Electricity Board, together with a knowledge of punched card machinery and, in particular, I.B.M. machines would be an advantage. Consideration will be given, however, to the further training of the successful candidate if this is necessary.

The successful candidate will be responsible to the Sub-Area Accountant for the organisation and control of all machine room functions.

Applications giving details of experience, etc., should be addressed to The Manager, Leicester Sub-Area, Charles St, Leicester, within 14 days of the date of this advertisement.

Coventry Sub-Area

Vacancy No. 48/60.
SENIOR ASSISTANT (STORES)

Salary: N.J.C. Grade 4, £890 x £30—£1,010 per annum.

The successful candidate will be responsible for the efficient layout and operation of the Sub-Area Central Stores. Ability to control and supervise both stores personnel and clerical staff essential.

Applications giving details of experience, etc., should be addressed to The Manager, Coventry Sub-Area, Sandy La, Coventry, within 14 days of the date of this advertisement. (R 416)

YORKSHIRE ELECTRICITY BOARD

Head Office

SECOND ASSISTANT ENGINEER
(SYSTEM DESIGN)

THE duties of this post will include the preparation of schemes for the reinforcement and extension of the Board's 66 kV and 33 kV systems and substations and points of supply from the Central Electricity Generating Board.

Applicants should have a good technical education and a University degree in Electrical Engineering will be considered an advantage. They should have considerable experience in the planning, construction and operation of distribution systems. Experience of 66 kV or lower voltage systems supplying heavy industrial loads is desirable.

Salary: N.J.B. Class BX, Grade 5, £1,180 (transitional) x £40 to Scale 14, £1,340/£1,515 per annum.

Candidates who applied in April for a post with the same title (but related to 11 kV and lower voltage work), may ask by letter for their applications to be reconsidered for the present vacancy.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Secretary, Yorkshire Electricty Board, Wetherby Road, Scarcroft, nr. Leeds, not later than 29 July, 1960.

No. 4 (Leeds) Sub-Area

SECOND ASSISTANT ENGINEER
(ESTIMATING, INSTALLATION AND APPLIANCE MAINTENANCE)

Applicants should possess a sound technical training and a wide experience in the Electrical Contracting Industry and should be capable of preparing specifications, estimates and tenders for all classes of installation work, combined with the control of staff and workpeople.

They should possess sound commercial ability and be able to pursue a sales policy concerned with the development of "off-peak" load.

Corporate membership of the Institution of Electrical Engineers or an equivalent qualification would be an advantage.

Salary: N.J.B. Class L, Grade 7 (Scale 13), £1,245/£1,410 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, Yorkshire Electricity Board, No. 4 (Leeds) Sub-Area, Bramhope, nr. Leeds, not later than 29 July, 1960.

No. 7 (Grimsby) Sub-Area

GRIMSBY DISTRICT
SECOND ASSISTANT DISTRICT ENGINEER

Applicants should preferably be Corporate members of the Institution of Electrical Engineers or hold equivalent qualifications. They should have had a sound training and extensive experience in the design, construction, operation and maintenance of H.V. and L.V. underground and overhead distribution systems, substation plant and ancillary equipment in both urban and rural areas.

Salary: N.J.B. Class H, Grade 7 (Scale 10), £1,010/£1,130 per annum.

Sub-Area Headquarters

CLERK OF WORKS

The successful candidate will be responsible for the supervision of various Building and Civil Engineering works within the Sub-Area.

Applicants must have a thorough knowledge of the building trade including experience in connection with reinforced concrete structures and foundations. They must be conversant with plans, specifications, bills of quantities and competent to set out work, give levels and keep all the necessary records and progress reports.

Membership of the Institute of Clerks of Works will be an advantage.

Salary: N.J.B. Class K, Grade 12 (Scale 7), £845/£930 plus personal allowance of £60 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, Yorkshire Electricity

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Board, No. 7 (Grimsby) Sub-Area, Moss Rd, Grimsby, not later than 29 July, 1960.

No. 6 (Hull) Sub-Area

GOOLE DISTRICT
SECOND ASSISTANT DISTRICT ENGINEER

Applicants should have had sound practical experience in the operation, maintenance, planning and construction of H.V. and L.V. underground and overhead lines and substations.

Candidates should have the Higher National Certificate in Electrical Engineering or possess equivalent qualifications.

The successful candidate will be required to undertake standby duty and to reside in Goole or near vicinity.

Salary: N.J.B. Class F Grade 7 (Scale 8), £890/£990 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience should be forwarded to the Manager, Yorkshire Electricity Board, No. 6 (Hull) Sub-Area, Ferensway, Kingston-upon-Hull, not later than 29 July, 1960. (R 408)

NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE

Burton Street, Nottingham

PRINCIPAL: D. A. R. CLARK
M.SC.(TECH.), M.I.MECH.E.

APPLICATIONS are invited for the post of:

LECTURER IN LIGHT CURRENT ELECTRICAL ENGINEERING

Salary in accordance with the Burnham Technical Scale as follows:

£1,370 x £35—£1,550 per annum.

A salary above the minimum will be paid in approved cases. Research encouraged. Facilities and equipment available.

Further particulars and form of application may be obtained from the Principal, to whom completed forms should be returned not later than 29 July, 1960. (R 420)

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER
EASTBOURNE DISTRICT

SALARY £800 x £15—£875 under N.J.B. Class F, Grade 9. Preference given to applicants with technical qualifications up to H.N.C. standard and with practical experience of the construction, operation and maintenance of M.V. and 11 kV underground and overhead systems. The successful candidate will be required to reside in or near Eastbourne. Applications quoting ET and naming two referees to District Manager, Seeboard, Electric Hse, Grove Rd, Eastbourne, by 27 July, 1960.

ASSISTANT DISTRICT ENGINEER
BRIGHTON AND HOVE DISTRICT

Salary £890/£990 under N.J.B. Class H, Grade 9. Superannuable. Applicants, preferably Graduate Members of the Institution of Electrical Engineers, should have had training and experience in the construction, operation and maintenance of underground H.V. and M.V. distribution systems up to and including 33 kV. The successful candidate will be required to undertake standby duties and a regular user's car allowance will be available if appropriate. Applications quoting ET and naming two referees to District Manager, Seeboard, Electric House, Castle Square, Brighton by 27 July, 1960.

DISTRICT COMMERCIAL ASSISTANT
TUNBRIDGE WELLS DISTRICT
CENTRED ON EAST GRINSTEAD

Annual salary under N.J.C. Grade 2 £700/£775. Applicants should have a good knowledge of electrical equipment and tariffs. Duties include meeting consumers in connection with the sale and installation of appliances.

Applications quoting ET and naming two referees to District Manager, Seeboard, Town Hall, Tunbridge Wells, by 27 July, 1960.

GEORGE WRAY,
Secretary.
(R 405)

AIR MINISTRY

Works Designs Branch

REQUIRES in London and Provinces ENGINEERING DESIGNER DRAUGHTSMEN experienced in preparation of schemes for illumination and electrical equipment of buildings or schemes for H.V. and M.V. electrical distribution. Candidates should have served a recognised apprenticeship or had equivalent training and also have had practical experience. O.N.C. an advantage. Financial assistance and time off given for recognised courses of study. Promotion and pension prospects. Five-day week with 18 days' paid leave per year initially. Overseas tours for which special allowances granted. Salary: in London ranges from £680 (at age 25) to £900 p.a. for men; from £673 to £868 for women. Somewhat lower in Provinces. Commencing salary dependent on age, qualifications and experience. Applicants, who must be natural born British subjects, should write to Air Ministry, W.G.d., Lacon Hse, Theobalds Rd, London W.C.1, or apply to any Employment Exchange quoting King's Cross 896, giving age, details of training, qualifications, full particulars of former posts held and copies of any testimonials. Candidates selected will normally be interviewed in London and certain expenses reimbursed. (R 283)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

Revised Advertisement

Vacancy No. 175/ET/60.

APPLICATIONS invited for the superannuable N.J.B. appointment of:

PLANNING ENGINEER
USKMOUTH "B" POWER STATION

Salary: Schedule A, Class K, Grade 7, Scale 12, £1,155/£1,305 per annum.

Applicants should possess H.N.C. or equivalent qualifications and have had experience of organising heavy maintenance work. The successful applicant will be responsible to the Deputy Station Superintendent for the planning of all overhaul and preventive maintenance. The appointment offers ample scope for initiative and experience to the right person.

Previous applicants need not re-apply.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-Fedwen Rd, Gabalfa, Cardiff, to be returned by 29 July, 1960. (R 425)

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD

Regional Engineer's Department

APPLICATIONS are invited for appointments on the permanent staff of the Board generally in accordance with the Whitley Council conditions of service.

The Board is undertaking a considerable programme of hospital development and the persons appointed will be engaged on varied and interesting work.

Engineering General Grade

Applicants should be (i) Corporate Members of the Institution of Electrical Engineers or (ii) have passed the Institution's examination and be Graduate Members, and be experienced in the preparation of specifications, drawings and estimates for electrical installations in hospitals and large public buildings.

Salary Scale: £910 x £35(1) x £40(2) x £45(5) x £50(7)—£1,600. Bar at £1,025 for graduate members of the Institution. Corporate members commencing salary between £1,160 and £1,300, London Weighting allowance of £40/£50 p.a. payable in addition.

Applications stating age, qualifiations, experience, present appointment and salary, together with the names and addresses of three referees, should be sent to the undersigned at 40 Eastbourne Ter, London W.2, by not later than 25 July.

E. G. BRAITHWAITE,
Secretary.
(R 401)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

THIRD ASSISTANT ENGINEERS

(a) HEMEL HEMPSTEAD DISTRICT
170/60.N.

(b) NORTH ESSEX DISTRICT
174/60.N.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, including substations.

Salary: N.J.B. Class F, Grade 9 (£800/£875).

For these appointments apply by letter to:

(a) R. C. W. Lester, M.I.E.E., Manager, Hemel Hempstead District, Eastern Electricity Board, Bridge St, Hemel Hempstead, Herts.

(b) J. C. Horrell, M.I.E.E., Manager, North Essex District, Eastern Electricity Board, Cressing Rd, Braintree, Essex, by 29 July, 1960.

Chilterns Sub-Area

SUB-AREA HEADQUARTERS
175/60.N.

THIRD ASSISTANT ENGINEER
(ELECTRICAL ENGINEERING CONSTRUCTION)

Candidates should have had experience in the construction of substations, the erection of overhead lines and the laying and jointing of underground cables at voltages up to 33 kV.

Salary: N.J.B. Class L, Grade 10 (£1,010/£1,130).

Apply by letter to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend St, Bedford, by 29 July, 1960.

Essex Sub-Area

SUB-AREA HEADQUARTERS
176/60.R.

FOURTH ASSISTANT ENGINEER (CIVIL)

Candidates should have received a technical education to Higher National Certificate level in building and should possess a sound knowledge of building construction with experience in the preparation of specifications, bills of quantities, estimates, contracts, and the settlement of accounts in connection with new building and maintenance of properties.

Salary: N.J.B. Class L, Grade 13 (£845/£930) plus £50 London Allowance.

Apply by letter to G. M. Holland, M.I.E.E., A.M.B.I.M., Engineer, Essex Sub-Area, Millfield, Bentley, nr. Brentwood, Essex, by 4 Aug., 1960.

Northmet Sub-Area

TOTTENHAM DISTRICT
177/60.R.

FOURTH ASSISTANT ENGINEER
(Ref. 989)

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems, including substations.

Salary: N.J.B. Class F, Grade 11 (£690/£785) plus London Allowance.

Apply by letter to the Manager, Eastern Electricity Board, 312 High Rd, Tottenham, N.15, by 25 July, 1960.

Chilterns Sub-Area

BEDFORD DISTRICT

(1) JOINTERS
178/60.R.

(2) JOINTERS' MATES
179/60.R.

Applications are invited for the above positions in the Bedford District.

Rates of Pay: N.J.I.C. Provincial Rates. (1) Jointers, 4s 11½d per hour; (2) Jointers' Mates, 4s 4½d per hour.

Applications stating position applied for should be sent to the Manager, Bedford District, Eastern Electricity Board, Prebend St, Bedford, by 29 July, 1960. (R 418)

CENTRAL ELECTRICITY GENERATING BOARD
North Eastern and Yorkshire Region

FOURTH ASSISTANT ENGINEER
(TELECOMMUNICATIONS)
TECHNICAL DEPARTMENT

APPLICATIONS are invited for the appointment as Fourth Assistant Engineer in the Telecommunications Section of the Technical Department, Yorkshire Division, based on Rotherham.

Applicants should have good technical qualifications and be experienced in applications of telecommunication technique for supervisory, telemetering and intertripping purposes as well as to automatic telephones. Works experience will be an advantage.

The salary for the appointment will be in accordance with the National Joint Board Agreement, Grade 11, BX (£735/£990 per annum) and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 26 July, 1960. (R 389)

CITY OF BIRMINGHAM
PUBLIC WORK DEPARTMENT
Mechanical and Public Lighting Section

VACANCY FOR ELECTRICAL ENGINEER
SPECIAL GRADE £785/£1,070 p.a.

APPLICANTS should be Associate Members of the Institution of Electrical Engineers or hold the Higher National Certificate, or the Diploma of the Illuminating Engineering Society (with five years' experience).

Candidates should have experience of lighting engineering with particular reference to public lighting.

The post is permanent, superannuable and subject to a medical examination.

Applications, stating qualifications, age and experience and naming two referees should reach the undersigned by 30 July, 1960.

Canvassing disqualifies.

HERBERT J. MANZONI,
City Engineer and Surveyor.

Civic Centre,
Birmingham 1.
4 July, 1960. (R 375)

CENTRAL ELECTRICITY GENERATING BOARD
Midlands Division

FOURTH ASSISTANT ENGINEER

REQUIRED in the System Operation Department at Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule B, Grade 11, Class CX. Salary range £735/£1,055 per annum.

The duties are of a technical and statistical nature and will include the evaluation of various costs affected by system operation, also control room duties during office hours. Applicants should have had sound engineering training, with preferably some experience in the Electricity Supply Industry. Good technical education required and the possession of the Higher National Certificate.

Apply, quoting Vacancy No. 184/60 on Form AE6, available from the System Operation Engineer, Warwick Hse, Redhill Rd, King's Norton, Birmingham 30, by 25 July, 1960. (R 412)

THE NORTH WESTERN ELECTRICITY BOARD

FOURTH ASSISTANT ENGINEER
(DRAUGHTSMAN)
ENGINEERING DEPARTMENT
AREA BOARD HEADQUARTERS
CHEETWOOD RD, MANCHESTER 8

APPLICANTS should have had good technical training and drawing office experience in the electrical design, layout and detailing of indoor and outdoor substations up to 33,000 volts, together with the preparation of protection, schematic and wiring diagrams.

Preference will be given to the holders of the O.N.C. or H.N.C. in Electrical Engineering.

Salary scale: Within the range £785/

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£1,055 p.a. Grade BX 10. N.J.B. Conditions.

Application forms to be obtained from the Secretary, The North Western Electricity Board, Cheetwood Rd, Manchester 8, and returned to him by 30 July, 1960.

FOURTH ASSISTANT DISTRICT
COMMERCIAL ENGINEER
(TECHNICAL SALES AND SERVICE)
NORTH WEST DISTRICT, MANCHESTER

Applicants should be capable of assisting the Technical Sales and Service Engineer in connection with industrial and commercial matters. Good technical training essential.

Salary scale: £640/£725 per annum. Grade G.13. N.J.B. Conditions.

Application forms to be obtained from the Manager (Staff Vacancy), No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, and returned to him by 27 July, 1960.

THIRD ASSISTANT DISTRICT ENGINEER
OLDHAM DISTRICT

Duties include assisting with the supervision of the operation, maintenance and construction of the distribution system, both overhead and underground, up to 33 kV, including substations. Applicants must be prepared to undertake standby duty and should preferably be suitably qualified.

Salary scale: £890/£990 p.a. Grade H.9. N.J.B. Conditions.

Application forms to be obtained from the Manager, No. 3 Sub-Area, The North Western Electricity Board, Union St, Oldham, and returned to him by 27 July, 1960. (R 372)

BAHAMAS ELECTRICITY CORPORATION

Vacancy Notice

APPLICATIONS are invited for the post of GENERATION CONSTRUCTION ENGINEER with the Bahamas Electricity Corporation in Nassau.

Applicants should be Corporate Members of the Institution of Electrical Engineers or the Institution of Mechanical Engineers and have had practical experience in the co-ordination of Power Station construction programmes.

The contract will be for a period of three years with a possibility of renewal or permanent appointment.

Salary will be £2,500 per annum.

Official housing is not available but a rent allowance will be paid equal to £85 per month less 15% of the officer's monthly salary.

First Class return air passages will be provided for the officer and his wife and family up to a maximum of three adult fares.

Upon satisfactory completion of the contract the person engaged will be entitled to 28 days' full pay leave for each year of service and in addition a gratuity equal to 10% of his annual salary for each year of completed service.

Two weeks' local leave may be granted annually at the discretion of the General Manager.

There is at present no income tax in the Bahamas.

The successful applicant will be expected to provide himself with a car but will be paid a car allowance of £150 per annum, plus 4½d per mile for all official mileage.

Applications should be sent by air mail in the first instance to the General Manager, Bahamas Electricity Corporation, c/o General Post Office, Nassau, Bahamas, and the envelope endorsed "Construction Engineer." Closing date for applications will be 30 July, 1960. (R 404)

CENTRAL ELECTRICITY GENERATING BOARD
Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER

REQUIRED at Hams Hall "A" Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K9, £1,010/£1,130 per annum, plus 10% shift duties.

A sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear are required. A knowledge of P.F. firing is desirable and appropriate technical qualifications will be an advantage.

Apply, quoting Vacancy No. 181/60MD on Form AE6, available from the Station Superintendent, Hams Hall Power Station, Lea Marston, Sutton Coldfield, Warwickshire. Closing date for receipt of applications: 29 July, 1960. (R 413)

CENTRAL ELECTRICITY GENERATING BOARD
South Wales Division

APPLICATIONS are invited for the following superannuable N.J.B. appointments in the South Wales Division:

DEPUTY STATION SUPERINTENDENT
ROGERSTONE POWER STATION
Vacancy No. 176/ET/60.

Salary: Schedule A, Class G, Grade 2, Scale 14, £1,340/£1,515 per annum.

Applicants should preferably be Corporate Members of the Institution of Mechanical and/or Electrical Engineers, and have had considerable experience in the operation, maintenance and administration of a modern Power Station.

MAINTENANCE ENGINEER (ELECTRICAL)
USKMOUTH "A" POWER STATION
Vacancy No. 177/ET/60.

Salary: Schedule A, Class K, Grade 5, Scale 14, £1,340/£1,515 per annum.

Applicants should have had experience of Power Station maintenance and should preferably be Corporate Members of the Institution of Electrical Engineers.

SHIFT CHARGE ENGINEERS
USKMOUTH "A" POWER STATION
Vacancy No. 178/ET/60.

Salary: Schedule A, Class K, Grade 6, Scale 13, £1,245/£1,410 per annum plus 10% shift enhancement.

Applicants should possess H.N.C. or equivalent qualifications, and have had operating experience in a modern Power Station.

STATION SHIFT CONTROL ENGINEER
UPPER BOAT POWER STATION
Vacancy No. 179/ET/60.

Salary: Schedule A, Class H, Grade 10, Scale 7, £845/£930 per annum, plus 10% shift enhancement.

Applicants should possess H.N.C. or equivalent qualifications, and have had operating experience in a modern Power Station.

TWO THIRD ASSISTANT ENGINEERS
DIVISIONAL TECHNICAL DEPARTMENT
CARDIFF

POST A—Vacancy No. 180/ET/60.

Salary: Schedule B, Class AX, Grade 6, Scale 12, £1,090/£1,305 per annum.

POST B—Vacancy No. 181/ET/60.

Salary: Schedule B, Class AX, Grade 8, Scale 10, £925/£1,130 per annum.

Post A will entail responsibility for organising the activities of a small group of engineers involved in the commissioning and testing of electrical plant in power stations and on the main 132 kV and 275 kV System, in addition to the maintenance of protective systems and the testing of this and other plant. Experience of work of a similar nature will be an advantage.

Post B will comprise assistance to the above engineer in this work.

Candidates should possess an Electrical Engineering Degree, or Higher National Certificate, and have served an Engineering Apprenticeship. Experience in the Electricity Supply Industry or in a large electrical manufacturing firm is desirable.

Applicants should state for which post they are applying.

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TWO FOURTH ASSISTANT ENGINEERS
DIVISIONAL TECHNICAL DEPARTMENT
CARDIFF
Vacancy No. 182/ET/60.

Salary: Schedule B, Class AX, Grade 9, Scale 9, £840/£1,055 per annum, according to experience; or Schedule B, Class AX, Grade 11, Scale 7, £735/£930 per annum, according to experience.

The work will present interesting and challenging problems, which will include the commissioning of electrical plant in Power Stations and on the 132 kV and 275 kV Grid, in addition to the maintenance and testing of operational protective systems.

Candidates should possess an Electrical Engineering Degree or Higher National Certificate, and have served an Engineering Apprenticeship. Experience with a large electrical manufacturing firm or in the Electricity Supply Industry is desirable.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-Fedwen Rd, Gabalfa, Cardiff, to be returned by 29 July, 1960. (R 419)

KENYA GOVERNMENT

TECHNICAL INSTRUCTOR (ELECTRICAL)

REQUIRED by Education Department. Appointment either on probation to permanent and pensionable establishment or on contract for one tour with gratuity at rate 13½% of total salary drawn. Normal tour 36/45 months. Commencing salary according to age and experience up to maximum, in scale (including Inducement Addition) rising to £1,341 a year. Outfit Allowance £40. Free passages. Liberal leave.

Candidates, under 45 years of age, must possess C and G Final Certificate or O.N.C. in Electrical Engineering and have had practical experience. Teaching experience desirable. Duties will be teaching students taking C and G and O.N.C. courses in the Kenya Polytechnic, Nairobi.

Write to the Crown Agents, 4 Millbank, London S.W.1. State age, name in block letters, qualifications and experience and quote M2A/51021/EE. (R 373)

CENTRAL ELECTRICITY GENERATING BOARD
South Wales Division
Vacancy No. 183/ET/60.

APPLICATIONS invited for the superannuable N.J.B. appointment of:

DEPUTY STATION SUPERINTENDENT
USKMOUTH "A" POWER STATION
WEST NASH, Nr. NEWPORT, MON

Salary: Schedule A, Class K, Grade 2, Scale 17, £1,695/£1,870 per annum.

Applicants should preferably be Corporate Members of the Institution of Mechanical and/or Electrical Engineers, and have had considerable experience in the operation, maintenance and administration of a modern power station.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-Fedwen Rd, Gabalfa, Cardiff, to be returned by 23 July, 1960. (R 424)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Fife Area

SECOND ASSISTANT ENGINEER
(PLANNING AND DEVELOPMENT)

APPLICATIONS are invited for the above vacancy in this area. Applicants should have a good theoretical knowledge and have had a sound practical and technical training to Higher National Certificate standard.

Conditions of employment will be in accordance with N.J.B. Agreement, and the salary scale for the post is Schedule A, Class J, Grade 7.

Applications, on the standard form, which may be obtained from the Area Manager, South of Scotland Electricity Board, East Port, Dunfermline, should be returned not later than Wednesday, 27 July, 1960. (R 432)

CHARTERED INSPECTING ENGINEER

ENGINEER preferably between 30 and 40 years of age, holding at least Associate Membership of the Mechanical and/or Electrical Institution(s) and qualified by Shop or Testroom experience, is required for Inspection/Test work relating particularly to Power Station heavy mechanical and/or electrical plant. Applicant should have had reasonable experience in report writing and technical correspondence.

Salary in accordance with qualifications and experience.

Staff Bonus and Pension Schemes. Applications, giving full details of age, qualifications and experience, within fourteen days to Preece, Cardew and Rider, Consulting Engineers, 8, 10 and 12 Queen Anne's Gate, Westminster, London S.W.1. (R 382)

ASSISTANT TEST ENGINEER for new Testing Laboratory dealing with electrical wiring accessories, cartridge fuses, etc. Applicants should have at least O.N.C. or equivalent, and have had previous experience in a similar capacity. A good salary will be offered according to age, experience and qualifications. Applications treated in strict confidence if addressed to Technical Manager, M.K. Electric Ltd., Shrubbery Rd, Edmonton, N.9. (R 433)

ASSISTANT ENGINEER wanted for a Sugar Factory in JAMAICA. Minimum qualification H.N.C. in Electrical Engineering or equivalent. Age 28-35, preferably married. Experienced in installation and maintenance of Factory electrical equipment. Three years' contract; House etc. provided; Salary according to qualification and experience; Passage(s) paid and leave paid at end of contract which is renewable. Applications to Assistant Engineer, c/o J. Wyllie Guild & Ballantine, 26 West Nile Street, Glasgow C.1. (R 397)

UNITED KINGDOM
ATOMIC ENERGY AUTHORITY
require

ASSISTANT ELECTRICAL ENGINEERS

AT CHAPELCROSS WORKS
ANNAN, DUMFRIESSHIRE

to be responsible to an Electrical Engineer for the commissioning and testing of new plant and the maintenance of existing plant in either:

(a) Nuclear Reactors comprising electrical auxiliary plant including large D.C. machines, operating on the Ward-Leonard System, also specialised equipment and control circuitry.

(b) Conventional Power Station plant consisting of turbo alternators and auxiliaries, H.V. distribution equipment, switchgear and associated protective devices.

Applicants must have served a recognised engineering apprenticeship and be Corporate Members of the Institution of Electrical Engineers or hold an equivalent qualification.

Salary between £860 at age 25 and £1,340 per annum.
Contributory Superannuation.
Staff Housing Scheme.
Send postcard to Personnel Manager at the above address for application form quoting ref. G.55/J8.
Closing date: 25 July, 1960.
(R 391)

FIBREGLASS
TRADE MARK

DEPARTMENTAL MANAGER

If you have a degree or higher national certificate in mechanical or electrical engineering, some experience of a continuously operated process, and would like to hold a responsible post in an expanding industry, you are invited to write about yourself to Mr R. G. Terrell, Production Manager, Fibreglass Ltd., St. Helens, Lancashire.

You would be given charge of one of the new crown fibre plants including melting, fiberisation and final processing. Your responsibilities would include day-to-day running and improvement of processes.

(R 422)

CROMPTON PARKINSON (CHELMSFORD) LTD. invite applications for appointments in the Machine Department, Estimating Section, at their Chelmsford Works. Applicants should have had a sound technical training and some experience in handling enquiries for a.c. and d.c. rotating plant and control gear up to 1,500 h.p./kW capacity. Congenial working conditions with excellent opportunities for advancement. Five-day week. Superannuation scheme. Apply in confidence stating age, whether married or single, with details of experience and training to Personnel Officer, Crompton Parkinson (Chelmsford) Ltd., Chelmsford. (R 264)

CABLE ESTIMATORS required by Hackbridge Cable Co. Ltd., Hackbridge, Surrey. Must be fully conversant with estimating for Paper, Rubber and Thermoplastic Cables. Pensionable post. Write stating age, experience and salary required. For the attention of the Sales Manager. (R 305)

ENERGETIC and competent WORKS MANAGER required for rapidly expanding Electrical Engineering Company in Altrincham. — Box No. 7919, Electrical Times. (R 316)

DRAUGHTSMAN (EXPERIENCED MECHANICAL AND ELECTRICAL ENGINEERING). Southampton vacancy. Applicants must have served an approved apprenticeship; possess technical qualifications up to ordinary level in either branch, and have completed National Service requirement. Permanent appointment subject satisfactory probationary period. Superannuation and travelling facilities.

Salary range £426 at age 21 rising to £791 per annum according to commencing age.

Apply in writing to Chief Docks Engineer (Mechanical and Electrical Section), British Transport Docks, Southampton Docks, giving full details, training and experience. (R 384)

ELECTRICAL ENGINEER SURVEYOR required by Cornhill Insurance Co. Ltd. in the North London area. Applicants must have Winding Shop experience and a technical education to H.N.C. or Grad.I.E.E. Salary commencing £800 per annum rising to £1,100 per annum. Pension Scheme. Reply stating age and experience to Chief Engineer, P.O. Box 10, 57 Ladymead, Guildford, Surrey. (R 434)

Central Electricity Generating Board

RESEARCH AND DEVELOPMENT DEPARTMENT

Research Laboratories, Leatherhead, Surrey

ENGINEERING DRAUGHTSMEN required in the **Drawing Office** at the **Research Laboratories, Leatherhead.**

(a) MECHANICAL DRAUGHTSMEN

for a wide range of work including the general design and layout of laboratory test rigs and prototype apparatus.

(b) ELECTRICAL/ELECTRONIC DRAUGHTSMEN

for the preparation from circuit diagrams of diagrammatic and working chassis layouts, and wiring diagrams for prototype electronic and light electrical equipment. Familiarity with Interservice Standards and Specifications for electronic equipment would be an advantage.

Previous laboratory experience is not essential but an important factor will be adaptability.

Salaries on a scale within the range £640/£875 p.a., according to duties and responsibilities.

Applications stating age, qualifications, experience, present position and salary, to the Personnel Officer, 24-30 Holborn, London E.C.1, by 25 July. Envelopes should be marked "Confidential Ref.: ET/260."

(R 381)

THE BRITISH ELECTRICAL AND ALLIED MANUFACTURERS' ASSOCIATION

DOMESTIC APPLIANCES DIVISION

Applications are invited for the post of TECHNICAL ASSISTANT in the Domestic Appliances Division of the Association.

The successful candidate, aged between 25 and 35, should offer:

(a) an electrical engineering qualification up to H.N.C. standard;
(b) knowledge of the domestic electrical appliances industry;
(c) administrative experience, including the writing of reports and committee minutes;
(d) proved ability to work on his own.

The post is a progressive one with prospects of advancement to a higher grade. Initial salary will fall within the range of £750/£1,100 depending on qualifications and experience. There is a contributory superannuation scheme.

Applications should be addressed to the Secretary, B.E.A.M.A., 36 Kingsway, London W.C.2.

(R 360)

ESTIMATING/SALES ENGINEER required. Applicants must have had experience of preparing tenders for Diesel Engine Generator sets up to 200 kVA. Good salary and excellent prospects—Hampson Industries Ltd., West Bromwich. (R 341)

ELECTRICAL ENGINEER required by multiple retail organisation with head office in London. Must be fully qualified, able to design commercial and industrial installations, prepare specifications and supervise contractors. Experience in modern store lighting would be an advantage. Age between 30 and 40. Write giving details of experience, salary, etc., to Box No. 7931, Electrical Times. (R 430)

ELECTRICAL ENGINEER with wide experience of estimating and supervision on big industrial and commercial installations required by large electrical contracting company in Manchester. Apply giving full details of training, qualifications, experience and salary expected to Box No. 8923, Electrical Times. (R 364)

TRANSFORMER DESIGNER

required

Leading Transformer Manufacturer in London area requires the services of a Transformer Designer, preferably with experience in medium to large power transformers.

Full details of qualifications, experience and present salary to Box 882, Dixons, 11 Hills Pl, Oxford St, W.1.

(R 393)

'ENGLISH ELECTRIC'

FUSEGEAR DIVISION

who manufacture a wide range of switchboards and distribution equipment incorporating H.R.C. fuses, have a limited number of vacancies for experienced

SALES AND CONTRACTS ENGINEERS

at their Liverpool Works. These appointments command a good salary, are permanent and pensionable with life assurance benefits after a short qualifying period. There are excellent opportunities for promotion and advancement for keen young electrical engineers interested in making a career with the Company.

Outside Technical Representatives for both Home and Overseas territories are appointed from the inside Engineering staff from time to time after completion of an initial period in the Works.

Qualifications required are H.N.C. or equivalent, together with sound practical training and experience in (a) industry, (b) electrical contracting or (c) electricity supply. Applications will also be considered from more junior engineers who are at present in the final year of study for the H.N.C. in electrical Engineering but who do not have commercial experience. In such cases training will be given. Generous assistance with removal and housing expenses will be given to successful candidates. Please write giving full details of qualifications and experience to Dept. G.P.S., Marconi House, Strand, London W.C.2, quoting reference ET497E.

(R 269)

ELECTRICAL ENGINEER required for Glasgow office staff, age 23-28. Applicants (H.N.C. minimum) should have had experience in the manufacture of electrical machines. Progressive salary with non-contributory pension. Applications stating age, nationality, qualifications and experience to British Engine Boiler and Electrical Insurance Co. Ltd., 98 West George St, Glasgow C.2. (R 429)

ELECTRICAL ENGINEER for reputable North Western Company producing high grade laboratory apparatus. This post offers fine prospects and an immediate first-class salary.

Applicants are invited to send fullest details to Box No. 7933, Electrical Times. (R 431)

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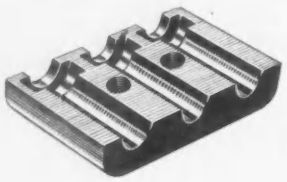
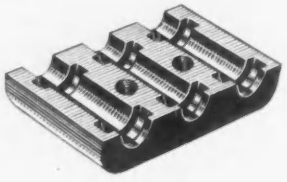
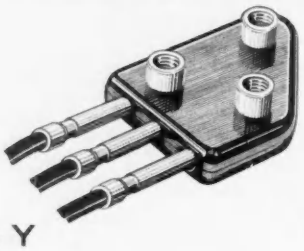

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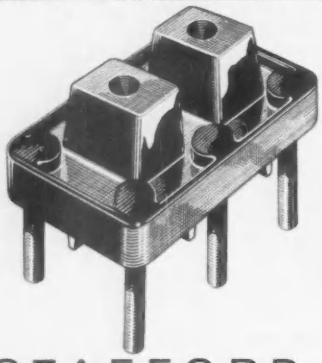
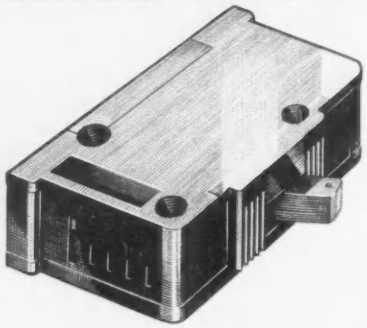

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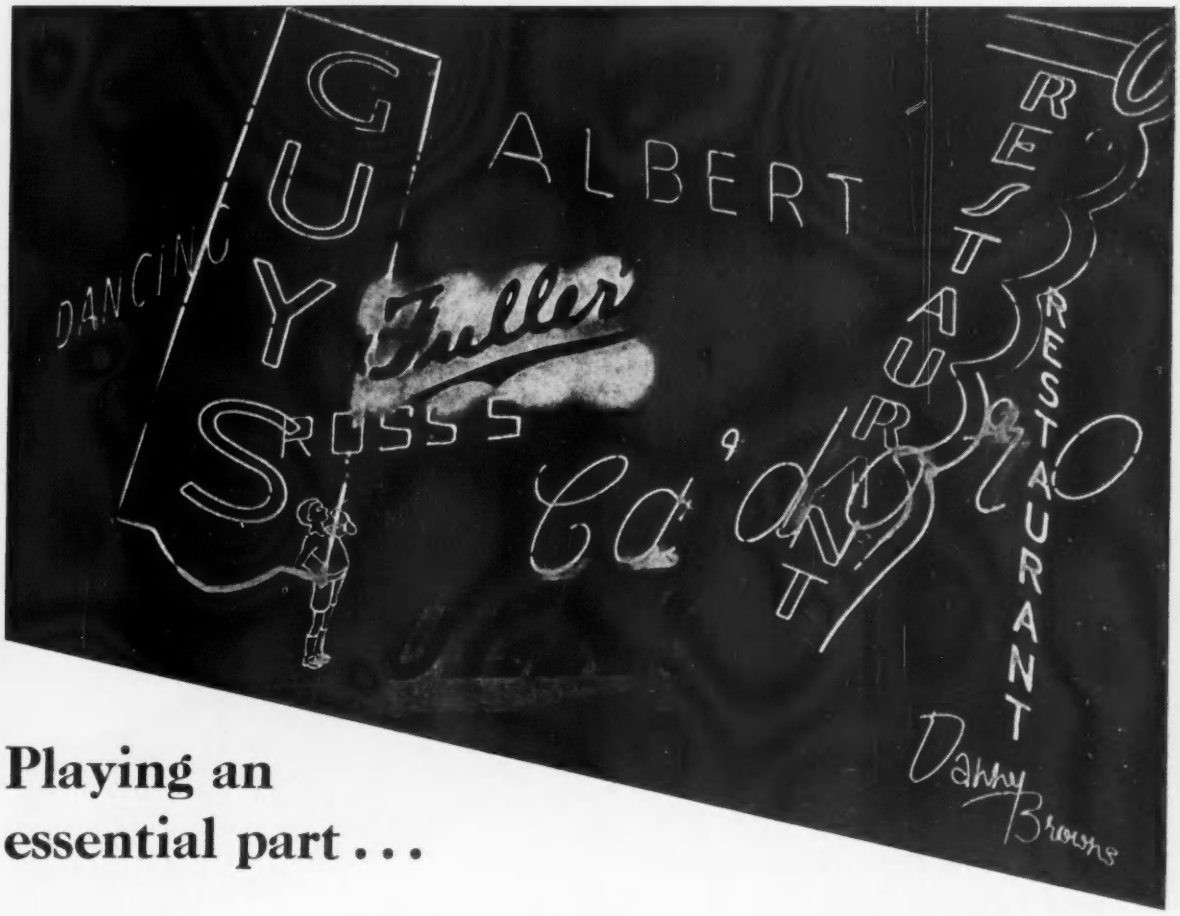

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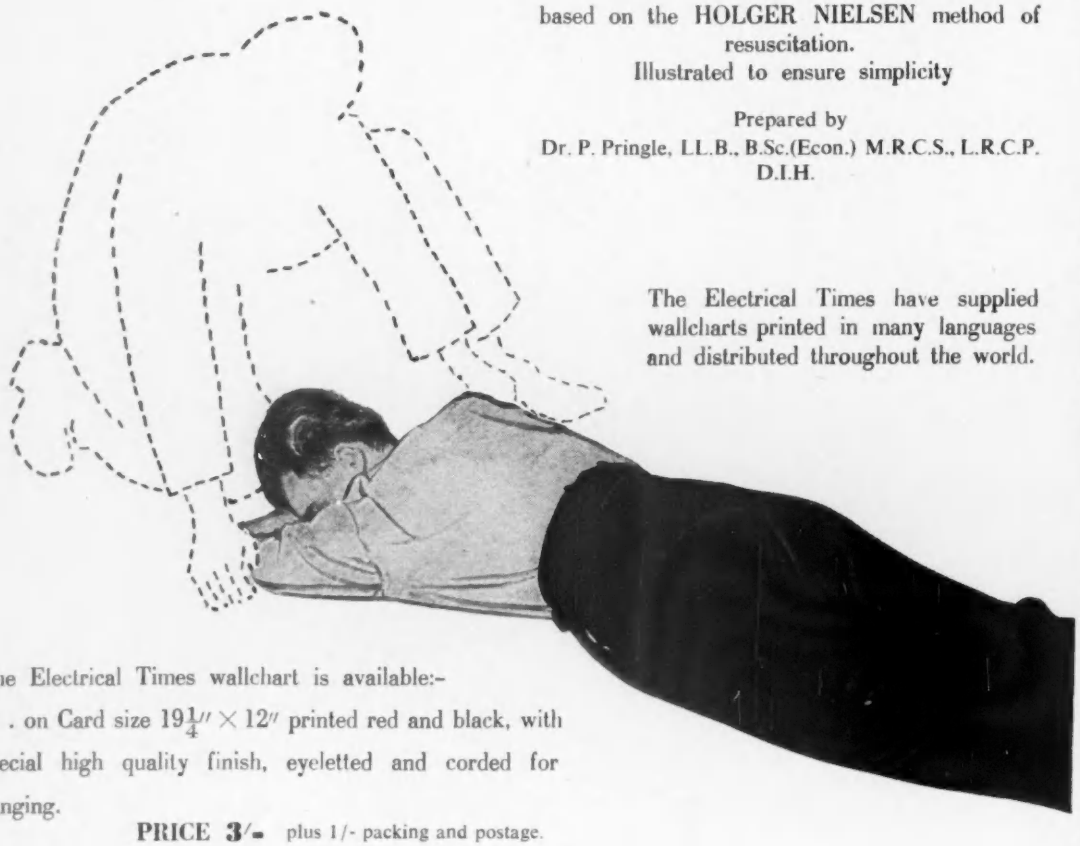

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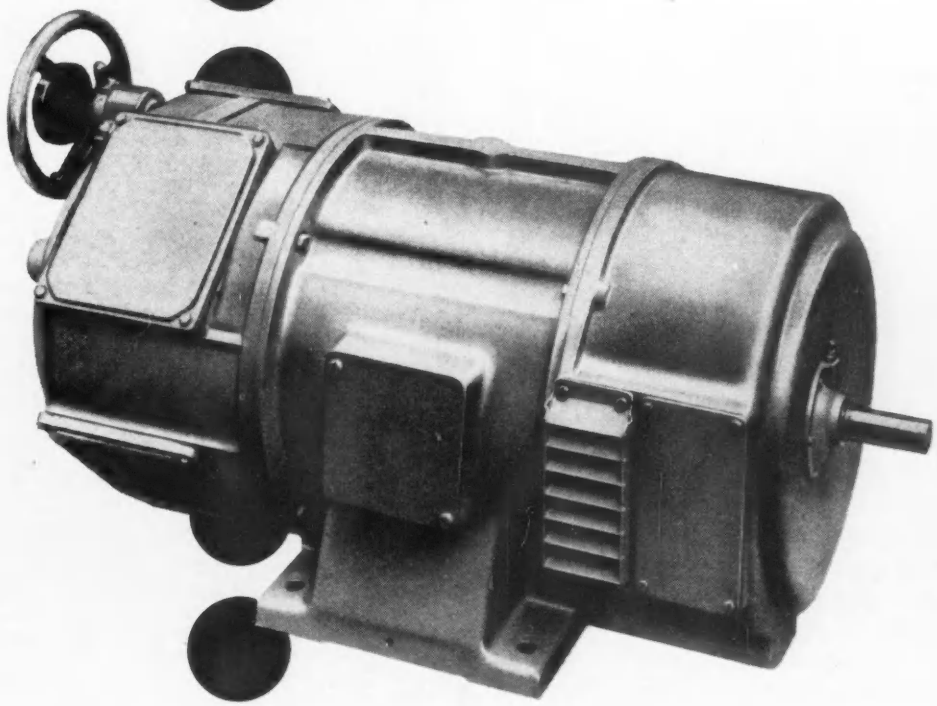

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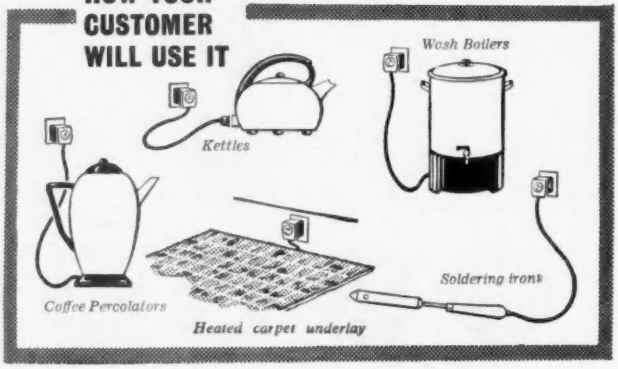

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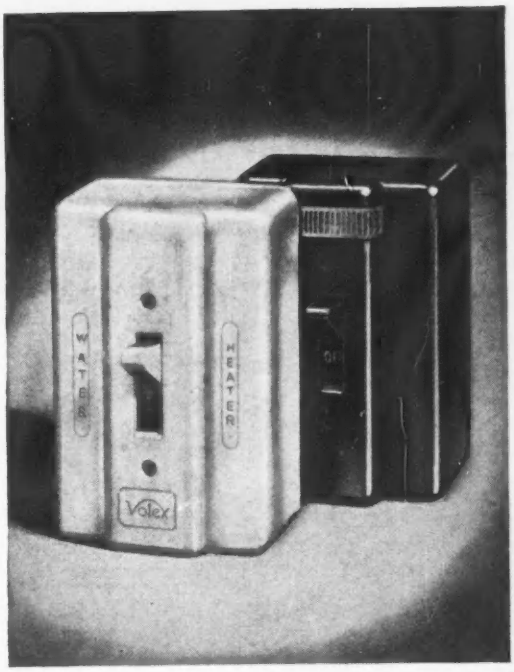

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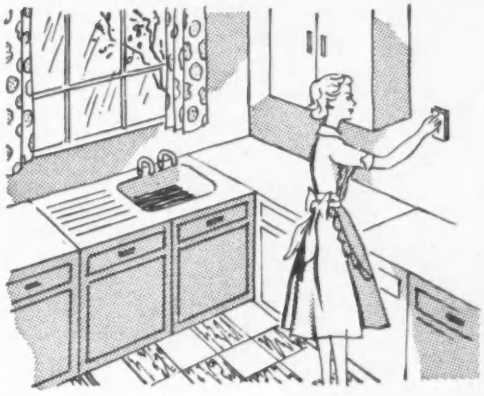

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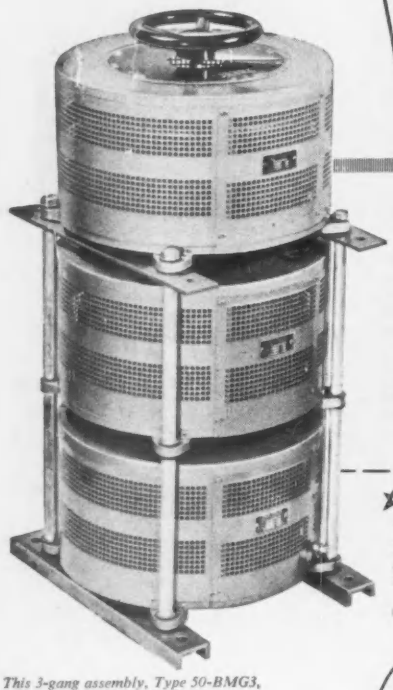

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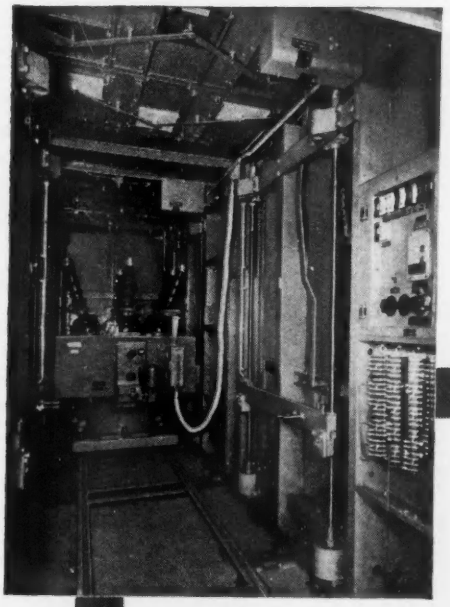
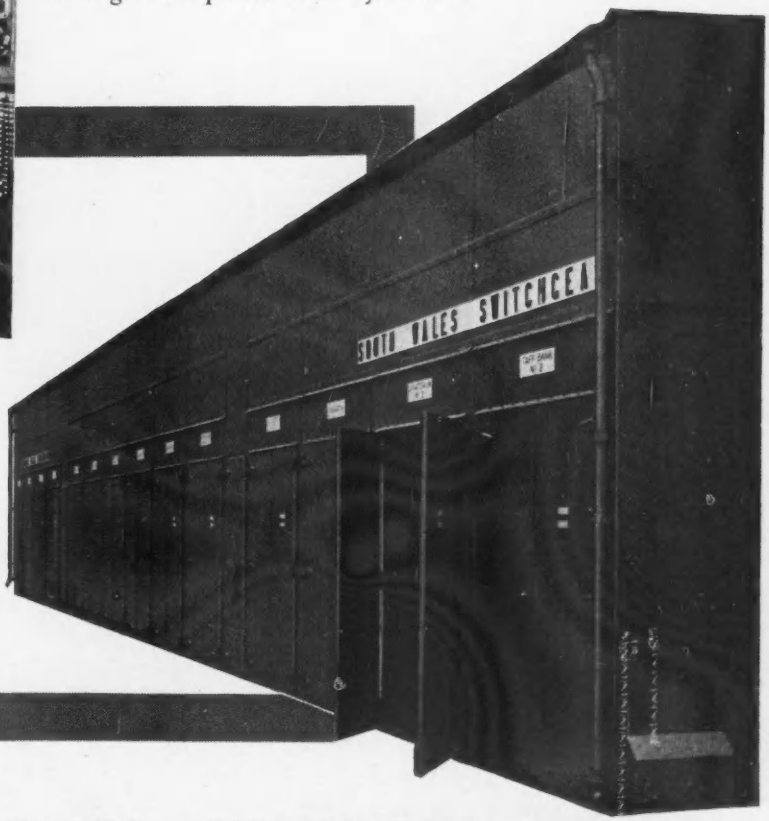


Above
A type UE1 33kV duplicate busbar switch unit showing the circuit-breaker in the rear busbar isolated position.



Right
A 14 panel single busbar type UE1 33kV switchboard.

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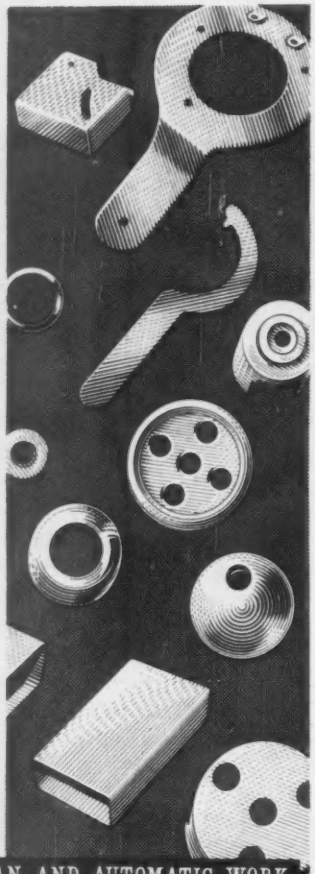

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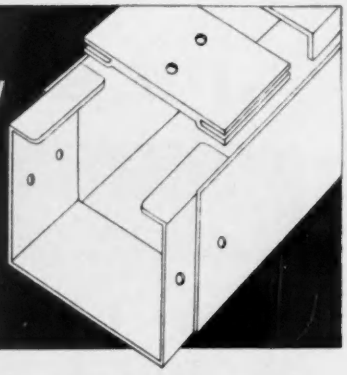

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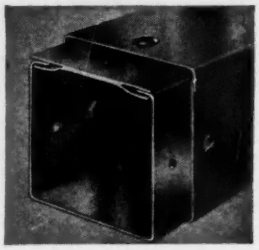

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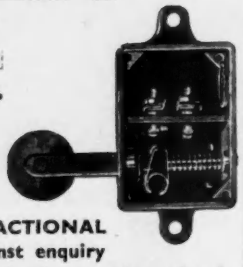

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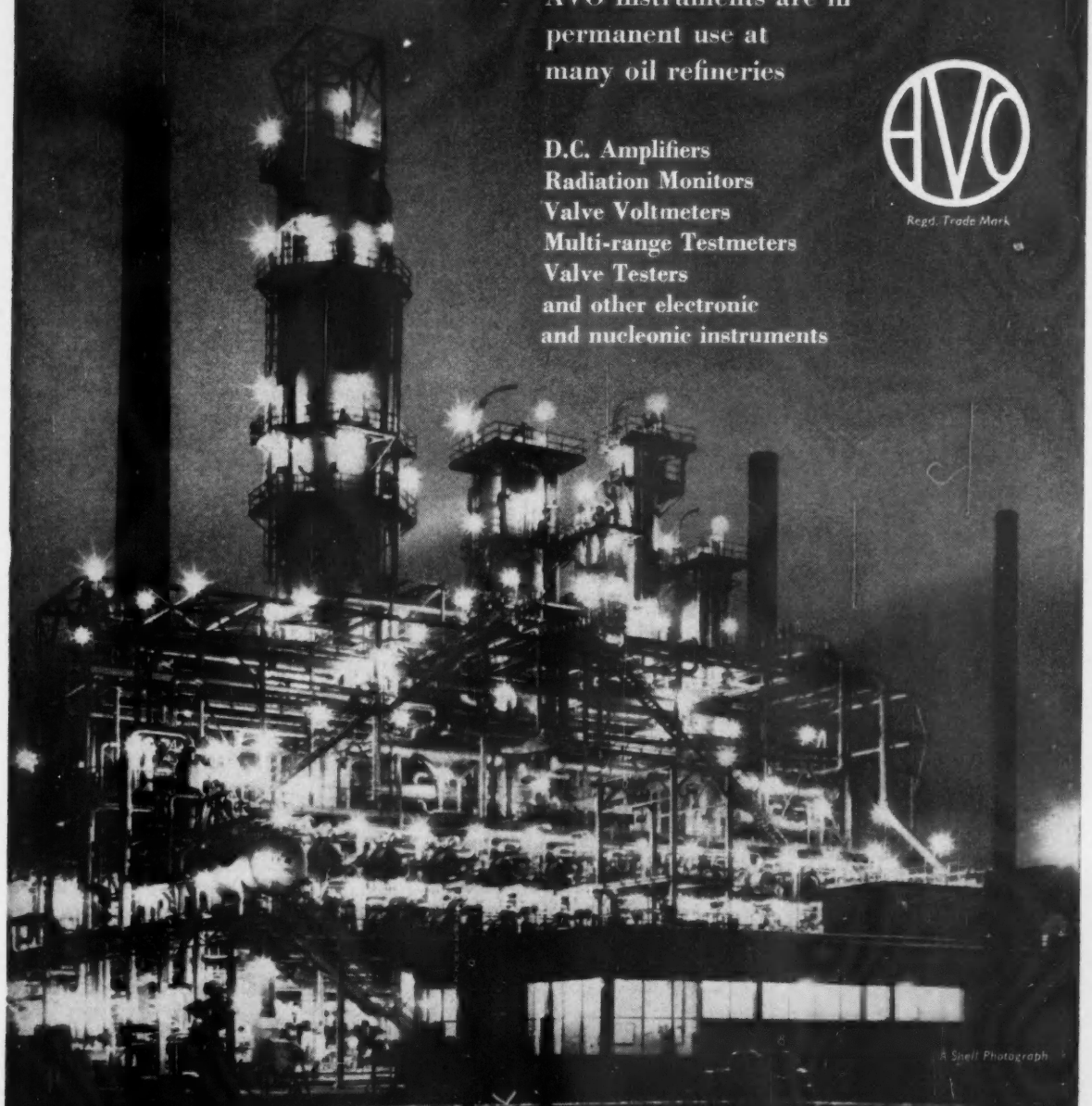

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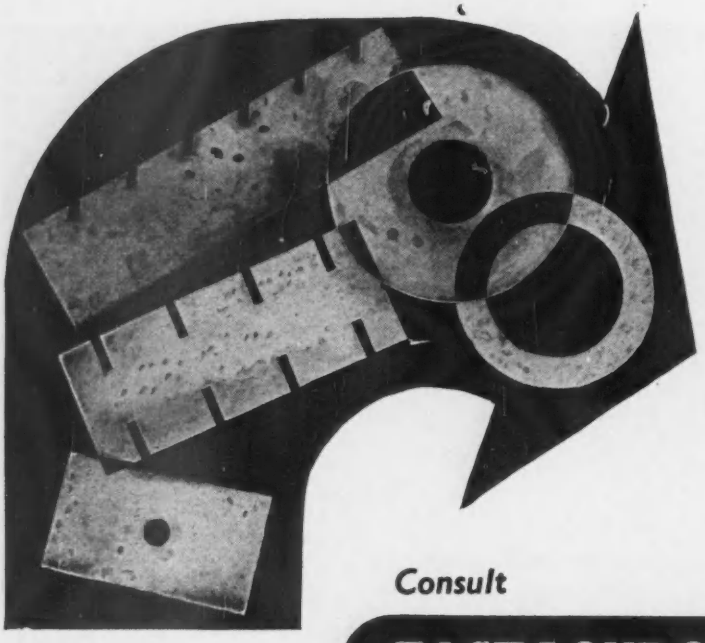

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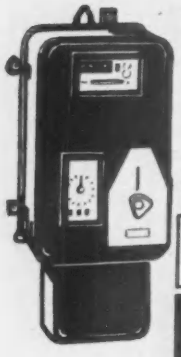

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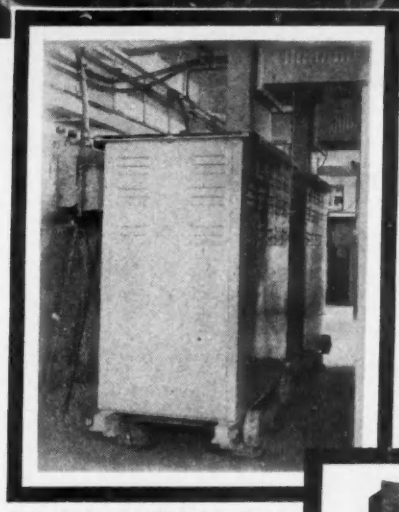
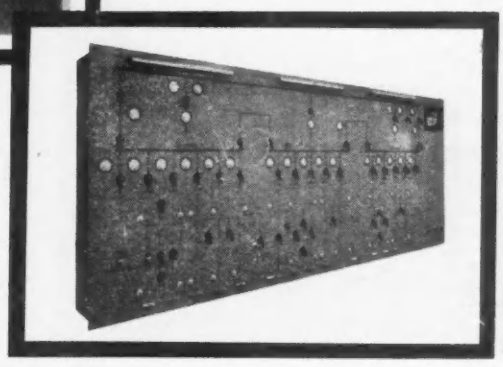


Two of the nine 750 kVA distribution Transformers.



Brush Control Panel in the Central Apparatus Room.

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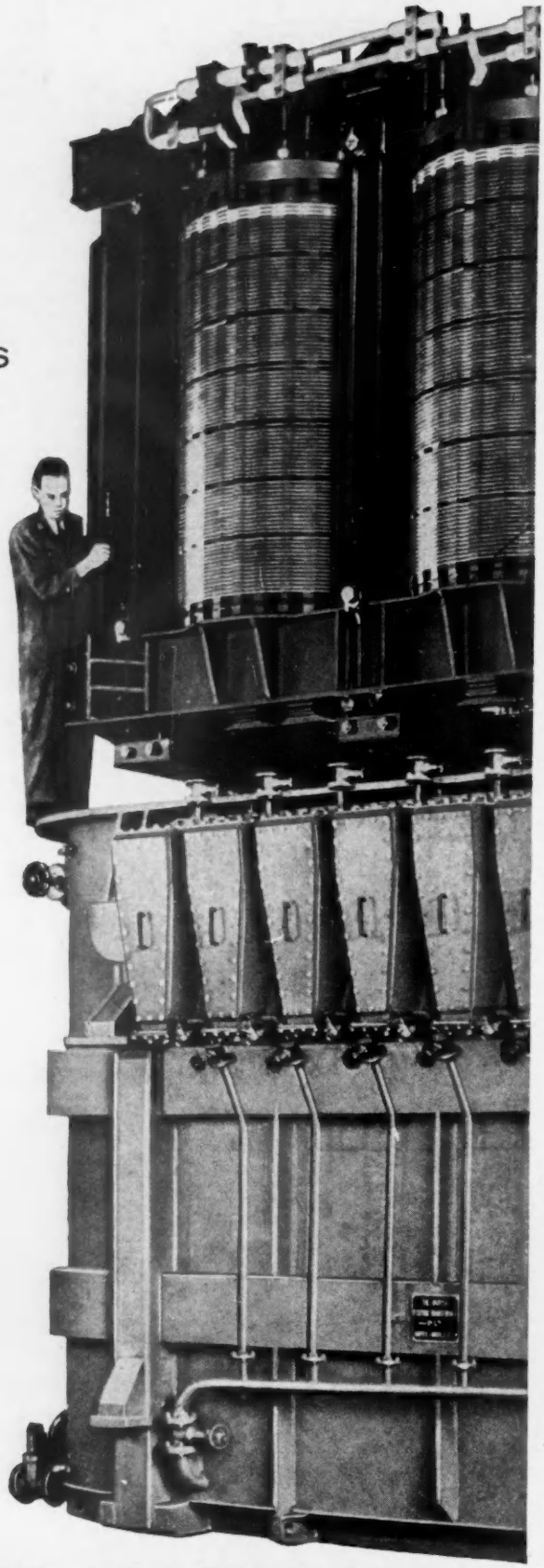

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(1) using unselected transistors...	<3mV
(2) with first pair matched for h_{FE}	<1mV
Change of output voltage referred to input for simultaneous or independent changes of supply voltages by ±1 volt	<4mV
Required source impedance ...	< 10 kΩ
Input impedance	25 kΩ
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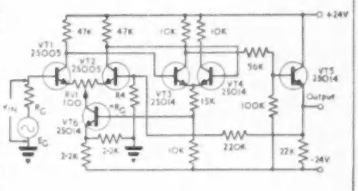

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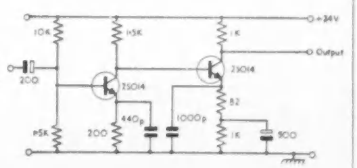

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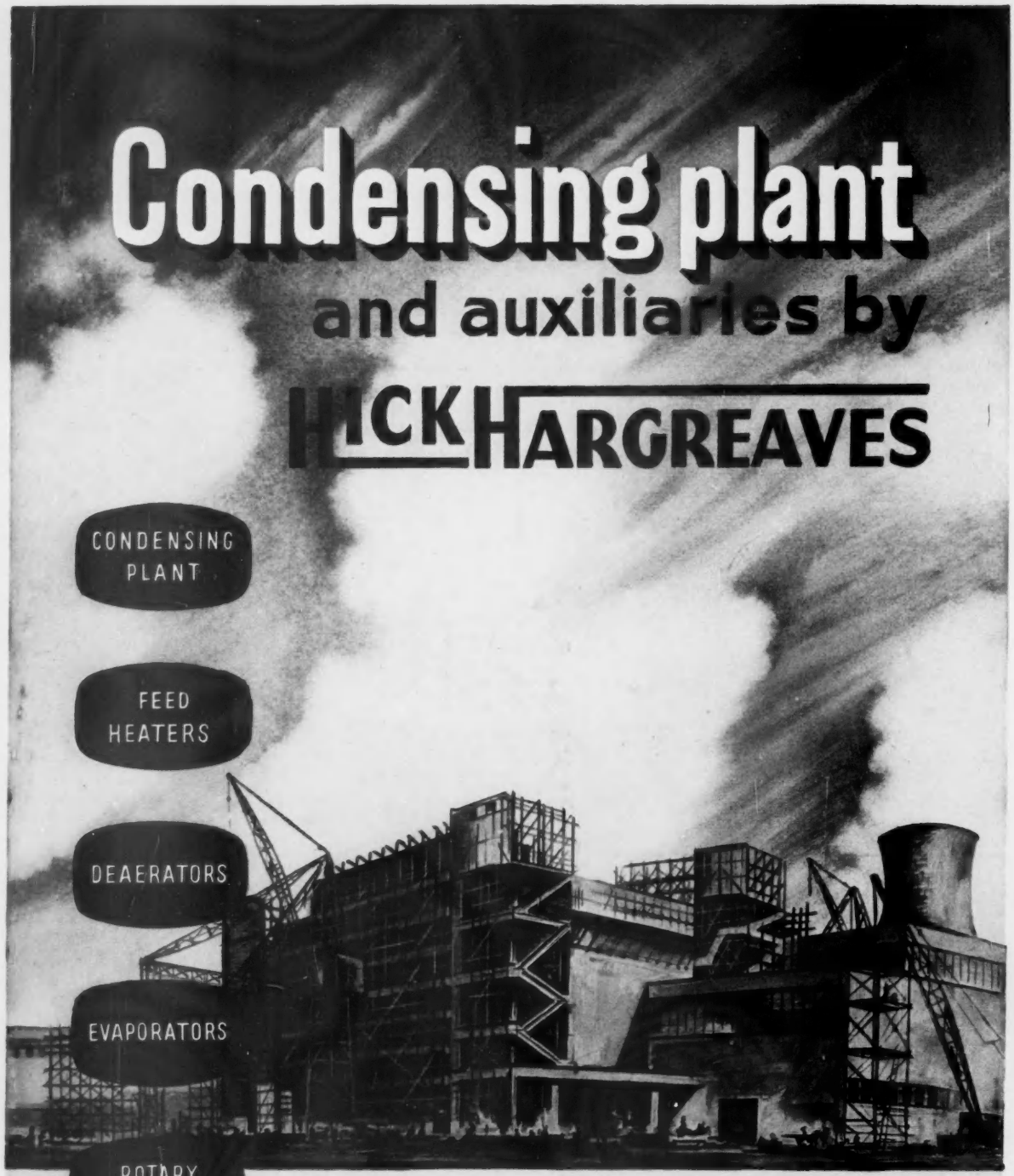

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